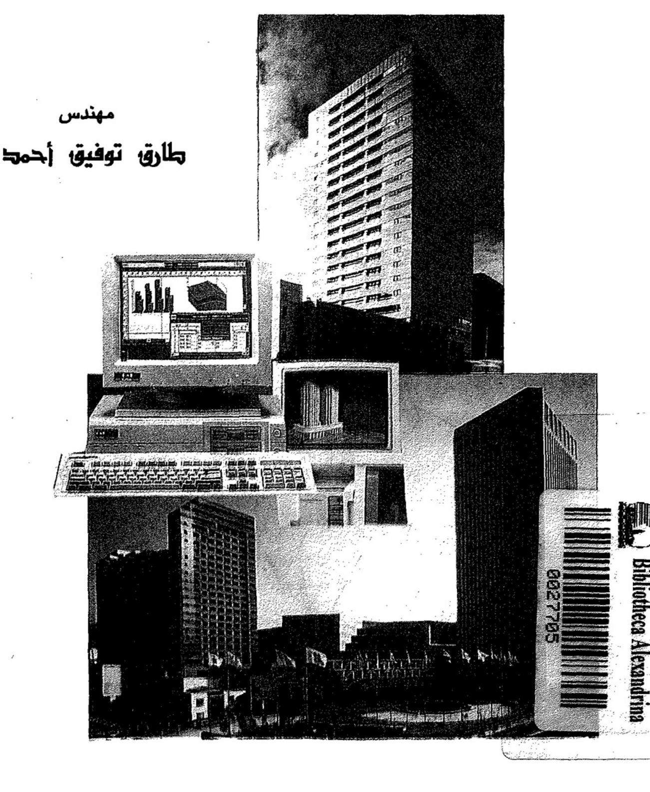
تصميم المنشآت الخرسانية

باستخدام

CADS ANALYSE

مهندس
طارق توفيق أحمد



تصميـــم المنشآت الخرسانية

باستخـدام

CADS ANALYSE

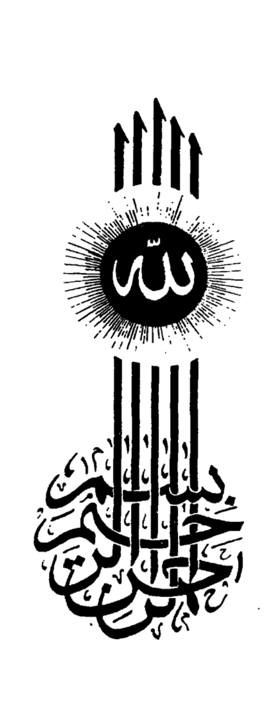
مهندس

طارق توفيق أحمد

دار الكتب العلمية

للـــنشروالتوزيـــع

١٨ شارع السبع ـ إمبابة ت : ٣٤٤٠٩٧٩



وقل ربِّ زدني علماً

الإهــداء

إلى كل عقل يبتكر ويفكر

.. وكل يد تبني وتعمر

أهدي هذا الكتاب

شكر

أتقدم بخالص الشكر لكل أستاذتي الذين علموني - إعترافا لهم بالجميل - وأشكر كل من عاونني في شركة (المهندسون المصريون للحاسبات).

وعلى ما أبدوه من تعاون مثمر معي وأيضا السادة العاملين بدار الكتب العلمية للنشر والتوزيع على مابذلوه من جهد ليظهر هذا الكتاب إلى النور بهذه الصورة المشرفة .

المؤلف

مقدمة

الحمد الله الذي هدانا لهذا وماكنا لنهتدي لولا أن هدانا الله . وبعد

يعـتـبـر هذا الكتـاب الأول من نوعـه الذي يتناول برنامج التـحليل والتـصمـيم الإنشائي (CADS ANALYSE)

أقدمه لجميع المشتغلين في حقل الهندسة المدنية وخاصة منهم العاملين في مجال التصميم الإنشائي وقد راعيت أن أقدم هذا الكتاب في صورة مبسطة ومتتابعة حيث أبدأ مع القارىء العزيز من الخطوة الأولي للتعامل مع الحاسبات الشخصية .
(PERSONAL COMPUTERS)

وهي مقدمة مختصرة عن نظام التشغيل (DOS) ثم مقارنة البرامج الإنشائية المختلفة والمستخدمة في التصميم وقد توخيت قدر جهدي الدقة في توضيح الفروق بينها.

وبإستعراض أجزاء هذا الكتاب سنجد أنه ينقسم إلى جزئين أساسيين .

الجـزء الأول : ـ ويحتوي على الأسس والقواعد النظرية اللازمة لتشغيل البرنامج.

الجزء الثاني : ـ على العديد من الأمثلة المحلولة والتي يصادفها المهندس في حياته العملية مما يوفر الوقت والجهد ويعطي فرصة لإظهار أفضل الحلول من الناحية الإقتصادية .

وأرحب بأي إستفسارات أو ملاحظات من السادة الزملاء .

وأرجو من الله عز وجل أن يتقبل مابذلته من جهد وهذه المساهمة المتواضعة في مكتبتنا العربية لعلوم الحاسب .

« ربنا لا تؤاخذنا أن نسينا أو أخطأنا ربنا ولا تحمل علينا أصراً كما حملته على الذين من قبلنا ولا تحملنا مالاطاقة لنا به وأعفِ عنا وأغفر لنا وإرحمنا أنت مولانا فإنصرنا على القوم الكافرين » .

القاهرة سبتمبر ١٩٩٢

مهندس / طارق توفيق أحمد



الباب الأول

الحاسبات والتصميم الهندسي

الفصل الأول
المقدمة ونظام التشغيل

الفصل الثاني
برامج التصميم

لدراسة الحاسب الشخصي يلزم معرفة شقين أساسين وهما مكوناته الصلبة

(HARDWARE) والبرمجيات (SOFTWARE)

ـ المكونات الصلبة

١ ـ وحدة الإدخال (Input Unit)

٢ ـ وحدة المعالجة المركزية (Central Processing Unit)

٣ ـ وحدة الإخراج (Output Unit)

١ ـ وحدة الإدخال Input Unit

يتم إدخال البيانات عن طريقها مثل لوح المفاتيح Keyboard ومشغل الإسطوانه Disk Drive والفارة Mouse .

٢ ـ وحدة المعالجة المركزية :

ويوجد بها الأجزاء التالية .

(أ) وحدة الذاكرة (Memory)

(ب) وحدة الحساب والمنطق (Arithmatic and Logic Unit)

(ج) وحدة التحكم (Control Unit)

(أ) وحدة الذاكرة :

وتنقسم إلى :

ـ ذاكرة القراءة (Read Only Momory (ROM

ويوجد بها برامج قابلة للتنفيذ بدون أي تعديل من المستخدم ولا يفقد مابها عند إنقطاع التيار الكهربي .

ـ ذاكرة الوصول العشوائي (Random Access Memory (RAM

وتسمي أيضابذاكرة القراءة والكتابة ويتم بها التعامل مع البيانات والبرامج

والنتائج ويفقد مابها عند فصل أو إنقطاع التيار الكهربي .

(ب) وحدة الحساب والمنطق

ويتم بها إجراء جميع العمليات الحسابية كالجمع والطرح والضرب والقسمة وكذلك العمليات المنطقية مثل أكبر من أو أصغر من أو يساوي أو لايساوي)

(ج) وحدة التحكم :

تتحكم في إنتقال المعلومات بين وحدات وحدة المعالجة المركزية - مثلا بين الذاكرة ووحدة الحساب والمنطق - وكذلك إخراج النتائج .

٣ - وحدة الإخراج Output Unit

ويتم إخراج النتائج عن طريقها مثل الشاشة Monitor والطابعة Printer والراسمة Plotter



- البرمجيات :

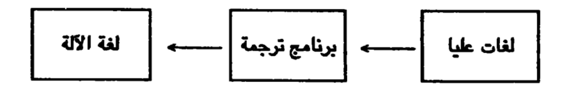
وتنقسم إلى الأجزاء التالية :

١ - برامج نظم تشغيل

وهذه البرامج يتم تصميمها بمعرفة الشركة المنتجة للحاسبات الشخصية وأكثرها إنتشارا (MS - DOS).

٢ - لغات برمجة

مثل لغات البيسك والفورتران والكوبول والباسكال وتسمي باللغات العليا (High Level Language) ولا يفهمها الحاسب مباشرة وتحتاج إلى برنامج للترجمة إلى لغة الآلة .



٣ - برامج التطبيقات

وتتناول كافة مجالات الهندسة والمحاسبة والإدارة ومعالجة الكلمات مثل
Autocad, Cads, Staad, Lotus 123, Dbase, Word Star ......

أوامر نظام التشغيل الهامة

الأمر	الصيغة	إستخداماته
DIR داخلي	A >DIR A >DIR/ P A >DIR / W	ـ لعرض الملفات الموجودة على إسطوانة المشغل A ـ مثل السابق ولكن على شاشات متتابعـــة . ـ عرض الملفات على شاشة واحدة بالعرض .
CLS داخلي	A >CLS	ـ تنظيـــف الشاشـــــة .
TIME داخلي	A >TIME	ـ لمعرفة الوقت الحالي مع إمكانية تغييره .
DATE داخلي	A >DATE	ـ لمعرفة التاريخ الحالي مع إمكانية تغييره .
COPY داخلي	B >Copy A:File Name	ـ لنسخ ملف (أو مـجـمـوعـة من الملفـات) من إسطوانة المشغل A إلى إسطوانة المشغل B .
TYPE داخلي	A >TYPE File Name	لإستعراض محتويات ملف نصي (Text file)
DEL داخلي	A >DEL File Name	لإلغاء ملف (أو مجموعة من الملفات)
FORMAT خارجي	A >FORMAT A: A >FORMAT A:/S	لتهيئة وتشكيل الإسطوانة جديدة مثل السابق مع نقل ملفات نظام التشغيل عليها

أوامر نظام التشغيل الهامة (تابع)

الأمر	الصيغة	إستخداماته
DISKCPOY خارجي	A > DISKCOPY A: A:	لنسخ إسطوانة كاملة بإستخدام المشغل A
DISKCOMP خارجي	A > DISKCOMP A: A:	للمقارنة بين الإسطوانة الأصلية والمنسوخة .
CHKDSK خارجي	A >CHKDSK	فحص الإسطوانة في المشغل A وإعداد تقرير عنها وعن الذاكرة .
MAKE DIRECTORY داخلي	A >MD Directory Name	لإنشاء فهرس فرعي على الفهرس الحالي لإسطوانة المشغل A
CHANGE DIERCTORY داخلي	A >CD Directory Name	الإنتقال من الفهرس الحالي إلى فهرس فرعي آخر .
REMOVE DIRECTORY داخلي	A >RD Directory Name	لإلغاء فهرس فرعي

برامج التصميم

أصبحت تلك البرامج (Computer Aided Design) السمة المميزة للحاسبات الشخصية طراز(IBM) والأجهزة المتوافقة معه .

ومن أشهرها برنامج الرسم الهندسي Autocad المستخدم للرسم في المستوي والفراغ وإعداد المناظير وكتابة الأبعاد والتعريفات على الرسم وطباعة الرسومات على الطابعات والراسمات من أحجام A4 حتي Ao وإمكانية تعديل المساقط الأفقية والرأسية والقطاعات وطباعتها مما يوفر الوقت والمجهود .

ويستخدم البرنامج السابق في الرسومات المعمارية والإنشائية والميكانيكية والكهربائية ويعتبر أقوي برامج الرسم وأكثرها إنتشارا وشيوعا في العالم .

وظهر حديثا برنامج مكمل عديد الإمكانيات وهو 3D Studio للعرض المجسم في الفراغ مع إمكانية توليد الرسومات المتحركة المتخصصة بدرجة عالية من الدقة والوضوح ويحتوي على محرر رسوم في الثلاثة أبعاد ويمكن للمستخدم توليد المجسمات بسرعة ودقة وإضافة المواد المستخدمة فيها بنفس الشكل واللون كالخشب والزجاج والأرضيات وخلافه بحيث تظهر على الشاشة كما في الطبيعة ويمكن إعداد الرسومات أولا بإستخدام Autocad وإدخالها على 3D Studio لإضافة اللمسات الأخيرة للتصميم كالمواد الخام ولعرض المنشآت بطريقة مبهرة بدورانها حول محاور عديدة مع إستخدام الإضاءة والظلال والكاميرات من مواضع مختلفة .

وفي مجال التحليل والتصميم الإنشائي ظهرت برامج عديدة منها

CADS ANALYSE
STAAD III
SAP 80

وتعتمد كلها على خطوات أساسية متتابعة وهي إدخال أبعاد وشكل المنشأ وفرض قطاعات لأعضائه وكذلك حالة الركائز وأخيرا الإحمال وحالات التحميل ثم الحل وظهور النتائج وهي العزوم والقوي المحورية وقوي القص والإزاحات مع إمكانية تصميم قطاعات المنشأ .

ويوضح الجدول التالي مقارنة بين تلك البرامج .

وجه المقارنة	CADS	STAAD	SAP80
الأجهزة	XT or AT	XT or AT	XT or AT + HARD DISK+ COPROCESSOR
الذاكرة	على الأقل ٢٥٦ كيلو بايت	على الأقل ٦٤٠ كيلو بايت	على الأقل ٦٤٠ كيلو بايت
الإسطوانات	عدد ٣ إسطوانات سعة ٣٦٠ كيلو بايت	عدد ٤ إسطوانات سعة ٣٦٠ كيلو بايت	على الأقل ٥ إسطوانات سعة ٣٦٠ كيلو بايت
إسلوب الحل	إدخال بيانات على شاشات متتابعة	كتابة وتوصيف المنشأ والإحمال بإستخدام برامج معالجة النصوص	كتابة وتوصيف المنشأ والإحمال بإستخدام برامج معالجة النصوص
التعديل	من داخل البرنامج وبسهولة .	من خارج البرنامج وبتعديل الملف النصي المكتوب	من خارج البرنامج وبتعديل الملف النصي المكتوب
تصميم المنشآت	في المستوي فقط .	في المستوي والفراغ Finite Elements	في المستوي والفراغ Finite Elements Dynamics
إظهار النتائج والرسومات	يتم بدقة عالية مع رسم المنشأ ونتائج الحل	يظهر تقرير للحل وبه نتائج المنشأ	يظهر تقرير للحل وبه نتائج المنشأ
السهولة	أسهل البرامج الإنشائية	أكثر صعوبة من CADS	أكثر صعوبة من STAAD
الأخطاء	تظهر بسهولة لتوقف البرنامج عن حدوثها كما أنه يشير إليها بوضوح	تحتاج إلى خبرة المستخدم لمراجعة الملف النصي واكتشاف الخطأ	تحتاج إلى خبرة المستخدم لمراجعة الملف النصي واكتشاف الخطأ

الباب الثانى
تشغيل البرنامج

الفصل الأول
متطلبات التشغيل

الفصل الثانى
اسطوانات البرنامج

الفصل الثالث
تجهيز البرنامج للعمل

الفصل الأول

متطلبات التشغيل

١ ـ حاسب شخصى من طراز (IBM XT OR AT) أو أحد الأجهزة المتوافقة معه .

٢ ـ ذاكرة العمل ٢٥٦ ك . بايت (RAM) كحد ادنى ومشغل اسطوانات مرنة ٢٥ , ٥ بوصة سعة ٣٦٠ ك . بايت وآخر ٥ , ٣" بوصة سعة ٧٢٠ ك . بايت أو إسطوانة صلبه (HARD DISK) .

٣ ـ نظام التشغيل الاصدار ٢,٠٠ وما يليه

(PC - Dos or MS-Dos, version 2.00 or Higher)

٤ ـ شاشة عرض أحادية اللون أوملونة (Monochrom or color monitor) .

٥ ـ أحد مهيئات الالوان والرسوم البيانية التالية :

C. G. A.	Color Graphic Adaptor
E. G. A	Enhanced Graphics Adaptor
V. G. A	Video Graphic Adaptor
	Hercules Graphic Card

٦ ـ مخرج طابعة على التوازى Parallel Port .

٧ ـ طابعة (اختيارية) من طراز (Epson FX or IBM Graphics Printer) .

الفصل الثانى
اسطوانات البرنامج

يتكون البرنامج من ثلاثة اسطوانات سعة ٣٦٠ ك . بايت وهى :

* Analyse disk (1)
* Analyse disk (2)
* Analyse disk (3) (Examples)

وتحتوى الأسطوانة الأولى على ثلاثة أنواع من الملفات وهى :

١ - ملفات قابلة للتنفيذ (Executable Files) .

وكل ملف يستخدم البيانات المدخلة ويتعامل معها ويعد النتائج كمدخلات للملف الذى يليه وهكذا حتي الوصول إلى نهاية البرنامج وهي :

APC	EXE	5632	1-01-80	4:12a
CONFIG	EXE	29885	8-16-85	4:32p
BASRUN	EXE	31744	5-07-82	12:00p
APO	EXE	39806	9-18-85	1:48p
AP1	EXE	515843	9-16-85	12:20a
AP3	EXE	3664	9-17-85	11:40a
AP4	EXE	25965	8-16-85	11:32a
AP8	EXE	21885	8-15-85	5:38p
AP9	EXE	29536	8-18-85	4:51p
AP11	EXE	26736	8-16-85	11:42a
AP13	EXE	64080	9-13-85	1:11p

ويلزم لتشغيل البرنامج تحميل الملف BASRUN.EXE فى الذاكرة ويستخدم الملف CONFIG. EXE لتهيئة البرنامج تبعا لنوع الجهاز المستخدم وامكانياته .

٢- ملفات نصية (Text Files) :

وتحتوى على الكتابة التى تظهر على الشاشة أثناء تشغيل البرنامج وهى :

AH	TXT	69300	8-19-58	11:54a
CADSREP	TXT	220	7-28-85	6:07p
CURRENT	TXT	128	1-01-80	1:48a
AS	TXT	1536	1-01-80	12:20a
AT 10	TXT	1769	1-01-80	12:06a
AT 11	TXT	1890	1-01-80	12:07a
AT 12	TXT	2404	1-01-80	12:07a
AT 14	TXT	1344	1-01-80	12:08a
AT 15	TXT	1161	1-01-80	12:08a
AT 16	TXT	3009	1-01-80	12:09a
AT 17	TXT	2484	1-01-80	12:09a
AT 18	TXT	1340	1-01-80	12:10a
AT 30	TXT	6932	8-3-85	12:54a
AT 40	TXT	558	8-3-85	12:55p
AT 80	TXT	640	8-3-85	12:57p
AT 90	TXT	4032	8-3-85	12:57p
AT 13	TXT	5221	1-01-80	12:28a
AT BO	TXT	980	8-30-85	12:58p
AT DO	TXT	5438	8-30-85	12:03p
INSTALL	TXT	240	7-31-85	5:19p
ATOO	TXT	7303	1-01-80	6:33a
CADSEND	TXT	362	7-25-85	5:43p
CADSLOAD	TXT	40	7-25-85	5:54p
CADSZERO	TXT	128	1-01-80	1:50a
ANAMES	TXT	128	1-01-80	12:09a

ويستخدم الأمر TYPE لعرض محتويات الملفات علي الشاشة فمثلا :

```
A >TYPE  AH.TXT
```

تظهر البيانات الآتية على الشاشة وهى الملف المساعدة من داخل البرنامج AH.TXT

Help Instructions Indes INTRODUCTION - How to use the Help Instruction .... Page 1 - How to enter date fron the keyboard .... Page 2 - How to use the SPREADSHEET system ....Page 3 -5 -How to use the SCIENTIFIC CALCULATOR .... Page 6-7 -How the ANALYSE program works .... Page 8-9 -Program assumptions and limitations .... Page 10 DATA ENTRY - Entering Joint Coordinates .... Pages 11-12 - Entering Member Location and Fixity .... Page 13 - Entering Member Properties .... Pages 14-15 - Entering Sup Ports .... Page 16 - Entering Load Cases . ... Page 17 - Entering Member Loads .... Page 20 - Entering Load Combinations .... Page 22-23 - Interpretation of results .... Page 24 - 26GRAPHICS - Frame Geometry, Deflections, Moments & Forces.. Pages 27- 30 Disk UTILTTIES - Backing uip / Formatting new disks .... Page 31 - Copying / Deleting / Renaming Jobs .... Page 32 INTRODUCT 10N - How to use the help Instructions. page 1 Whenever you press the help key (F1), the current screen display is sayed and page of the Help Instructions, usually relevenat to the section of the programthat you are presently running, will appear. At the bottom of the screen are bcommands that all ow you to access other Help Pages as easily as turning thepages of book. These commands are ... F1- Help, Takes you directly to this Help pagewher instructions for using these Help pages are found. F3 - go to :, allows you to jump airectly to any other help page by typing the num-

ber of the page then pressing the ENTER key, F4 - Back, allows you to turn back and examine the previous help page. F5- Indes, allows you to jump directly to the help Instructions Indes Page. F6 - Forward, allows you to turn forward to the next help page. ESC - Escape, takes you out of the help Instructions, restores the original screen display and allows you to continus the program from the point where you first asked for help. INTRODUCTION - Entering data from the kypboard.

Page 2 There are three ways of entering data into the program . . . . 1 Highlig hted character on screen (Menus, etc) . Only one key press is required. This is the key on the keyboard corresponding to the highlighted character of the opion required on the sreccn. 2 Flashing Cursor on screen . More than one key press is expected, so all entries must be terminated by presssing the ENTER key. A default value is usually prompted and may be accepted by just pressing the ENTER key. Pressing any other key will replace the prompted value with the new date just typed. The BACKSPACE key may be used to edit typing mistakes before pressing the ENTER key . 3 List entries. When multiple entries are expected (eg TRANSFER data to a list of other items) the program allows you to enter a group of numbers in one go. CONSECUTIVE NUMBERS eg : 1,2,3,4,5, & 6 are entered by typing 1-6 and ENTER. NON-CONSECUTIVE NUMBERS eg: 1, 3 & 7 are entered by typing 1,3,7 and ENTER. You may not mix the two formats in the same entry, howvere, the program always prompts ANY MORE ? Y/N so the two formats may be used alternately. INTRO DUCTION - How to use the spreadsheet page 3 ember 10 cation and fixity

em J1. Jnt X1 Coord Y1 Coord Y1 Coord J2. Jnt x2 Coord Y2 Coord Length Slope O.no . can (m) (m) no. can (m) (m) (deg) 1 2 F 0.000 2.600 3 F 1.750 3.240 20.088 2 3 F 1.750 3.240 F 3.500 3.880 1.863 20.088

3 0 < Input mode .

٣ - ملفات حزم الاوامر Batch Files

وتحتوى على مجموع أوامر لنظام التشغيل وتحميل ملفات البرامج القابلة للتنفيذ Executable وهى :

INSTALL	BAT	770	8-02-85	3: 46P
CADSINIT	BAT	256	2-14-89	7:42P
CADSFORM	BAT	431	7-31-85	1:27P
SETUP	BAT	2511	8-05-85	5:46P
CADS	BAT	37	7-25-85	6:04P
AUTOEXEC	BAT	207	7-28-85	1:01P
CADSCOPY	BAT	156	7-31-85	1:00P
CADSEND	BAT	31	2-14-89	8:56P
CONVERT	BAT	1440	7-25-85	6:05P
ANALYSE	BAT	50	2-14-89	8:57P
CADSHND	BAT	38	8-02-85	11:41a
GO	BAT	9	3-04-89	9:02P
CADSUTIL	BAT	21	2-14-89	8:56P
CADSRUN	BAT	50	7-31-85	12:26
CADSUTIL	BAT	31	2-14-89	8:56p

ونستخدم الأمر TYPE لعرض محتويات الملفات علي الشاشة فمثلا

```
A> TYPE  ANALYSE.BAT
```

تظهر الاوامر الآتية لتشغيل البرنامج :

```
echo off
cls
type cadsload.txt
cadsinit a ng
```

تحتوى الاسطوانة الثانية علي ملفات البرنامج اللازمة لادخال البيانات وخطوات الحل وطباعة النتائج والرسومات وخلافة ولا يمكن تشغيل البرنامج بدون هذه الاسطوانة ويلزم وجودها في مشغل الاسطوانات اثناء استخدام البرنامج من البداية إلى النهاية .

تحتوى الاسطوانة الثالثة على أمثلة محلوله باستخدام للبرنامج وهى :

1- Cadsex 1.
2- Cadsex 2.
3- Cadsex 3.
4- Cadsex 4.
5- Cadsex 5.
6- Cadsex 6.

الفصل الثالث

تجهيز البرنامج للعمل

أ- في حالة الأسطوانة الصلبة (Hard disk) :

١- نجعل الحاسب في وضع التشغيل (Power on) .

٢- ننتظر حتي يتم التحميل وبإدخال التاريخ والوقت سيظهر المحث

C:\>

٣- نستخدم أمر إنشاء الفهارس الفرعية MD وليكن اسم الفهرس الفرعي CADS ونكتب الأمر

```
C:\> MD CADS
```

ثم نضغط Enter للإدخال .

٤- ننتقل من الفهرس الرئيسي الجذري Root directory إلى الفهرس الفرعي Cads ولذلك نكتب الأمر

```
C:\> CD CADS
```

ثم نضغط Enter للإدخال فيظهر لنا المحث بالصورة الآتيه

C:\CADS>

٥- نستخدم الامر COPY لنسخ إسطوانات البرنامج التى تحتوي على الملفات الآتية

CADSUTIL. BAT	CURRENT. TXT	AH. TXT	CADSRUN. BAT	CADSREP. TXT
AP3. EXE	AP4. EXE	AS. TXT	APO. EXE	AP 1. EXE
AP 13. EXE	AT10. TXT	APS. EXE	AP9. EXE	AP 11. EXE
AT 15. TXT	AT16. TXT	AT11. TXT	AT 12. TXT	AT 14. TXT
AT 40. TXT	AT 80 . TXT	AT 17. TXT	AT 18. TXT	AT 30. TXT
ATDO. TXT	DISK . ID	AT 90. TXT	AT 13. TXT	CONFIG. SYS
ATOO. TXT	CADSINIT. BAT	INSTALL. BAT	INSTALL. TXT	CADSEND . TXT
CADSEND. BAT	CADS. BAT	CADSFORM. BAT	CADSCOPY. BAT	CADSLOAS. TXT
ANALYSE. BAT	CADSZERO. TXT	CONFIG. EXE	BASRUN EXE	CONVERT. BAT
KEYBUK. COM	CADSHND. BAT	DISLCOPT. COM	FORMAT . COM	MODE. COM
ANAMES. TXT	GO. BAT	CADSEND BAK	ANALYSE BAK	CADSUTIL . BAK
	(A)			

ولذلك نكتب الأمر

```
C:\CADS > COPY    A : *.*
```

ثم نضغط Enter للإدخال .

ومعناةإنسخ كل الملفات من الأسطوانة الموجودة فى المشغل (A)

٦ – نستخدم أمر إنشاء الفهارس الفرعية مرة أخرى وسيكون اسم الفهرس الفرعى A وهو لحفظ المسائل التى سيتم حلها بإستخدام البرنامج ومكانة داخل الفهرس الفرعى CADS ولذلك نكتب الامر

```
C:\CADS > MD A
```

ثم نضغط Enter للإدخال .

وللإنتقال للفهرس الفرعى A نستخدم الأمر cd بالصورة الآتية

```
C:\CADS >CD A
```

فيظهر لنا المحث

C:\ CADS \ A >

وسنجد الفهرس A خالى من أى ملفات ومستعد لتخزين المسائل المحلولة باستخدام البرنامج .

٧ـ للعودة للفهرس الجذرى .Root dir نستخدم الأمر

C:\CADS \ A >CD\

فيظهر لنا المحث

C:\>

تماما مثل قبل نسخ ملفات البرنامج .

ب ـ فى حالة الاسطوانتين المرنتين B, A الأولى سعة ٣٦٠ ك ب و الثانية سعة ٧٢٠ ك ب :

تكرر نفس الخطوات السابقة مع تغير المحث <\:C إلى <\:B دائما وستكون الأوامر كالآتى :

```
B:\>MD CADS
B:\CD CADS
B:\CADS>
B:\CADS>COPY A : * · *
B:\CADS>MD A
B:\CADS > CD  A
B:\CADS\A>
B:CADS\A>CD\
B:\>
```

مع مراعاة أن يكون مشغل الاسطوانات ٣,٥ً سعة ٧٢٠ ك بايت هو المحث

B:\>

جـ- فى حالة الاسطوانة المرنة سعة ٣٦٠ ك بايت والذاكرة العشوائية ٦٤٠ ك بايت (RAM) :

يمكن للمستخدم تشغيل البرنامج واظهار جميع النتائج باتباع الخطوات الآتية بدقة :

١- إنشاء الملف Config.Sys باستخدام الأمر

```
A>COPY CON CONFIG.SYS
```

ونضغط Enter للإدخال فيظهر لنا المحث علي هيئة ــــ

نكتب أمر إنشاء قرص تخيلى فى الذاكرة العشوائية (Virtual disk) وهو

DEVICE = VDISK. SYS 384 512 256 C:1

ثم نسجل الملف Config.Sys بالضغط على F6 أو Z ^ مع مراعاة أن يكون التسجيل على اسطوانة نظام التشغيل التي يتم بها تحميل الجهاز وايضا وجود الملف Vdisk.Sys عليها وهو أحد ملفات نظام التشغيل (DOS) والتأكد من ذلك نضع الحاسب فى وضع عدم التشغيل (Power off) ثم وضع التشغيل (Power on) .

٢- نستخدم قرص التشغيل المعدل وعليه Config.Sys الجديدة وننتظر حتى يتم التحميل وبادخال التاريخ والوقت سيظهر المحث

A:\>

نغير المسار إلى القرص التخيلى (Virtual disk) باستخدام الأمر

A:\> C :

ثم نضغط Enter للإدخال فيظهر لنا المحث

C:\>

ويمكن التعامل معه كأنه اسطوانه صلبه صغيرة الحجم (سعة ٣٨٤ كيلو بايت) ونكرر نفس الخطوات السابقة فى حالة الاسطوانة الصلبة مع مراعاة استخدام الملفات الأساسية لتشغيل البرنامج وهي:

```
Volume in drive A is CADS
Directory of A : /

APC.  EXE     APO. EXE     AP1.  EXE     AP3. EXE        AP4. EXE
AP8.  EXE     AP9.  EXE    AP11. EXE     AP13. EXE       AS. TXT
AT10.  TXT    AT11. TXT    AT12. TXT     AT14. TXT       AT15. TXT
AT16.  TXT    AT17. TXT    AT18. TXT     AT30. TXT       AT40. TXT
AT116.TXT     AT17. TXT    AT13. TXT     ATBO. TXT       ATDO. TXT
AT00.  TXT    AT90. TXT    DISK. ID      CURRENT . TXT   CADS . BAT
```

ومن مزايا هذه الطريقة :

١ـ تنفيذ خطوات البرنامج بسرعة فائقة لان التعامل مع البيانات وملفات البرنامج يكون دائماً فى مكان واحد هو الذاكرة العشوائية (RAM) وسيلاحظ أن الخطوات تتم بسرعة أكبر من سرعة الاسطوانة الصلبة (Hard disk) .

٢ـ توفير ثمن الاسطوانة الصلبة أو المشغل الاضافى (B) سعة ٧٢٠ ك ب (على الأقل) .

ولكن من عيوب هذه الطريقة :

فقد الملفات الموجودة في القرص التخيلى (Virtual disk) عند انقطاع التيار الكهربى أو الضغط خطأ على زر Reset المسئول عن اعادة تشغيل الجهاز لأننا كما نعلم تحمل البرنامج ونخزن ملفات البيانات والحل مؤقتا فى القرص التخيلى الموجوده فى الذاكرة العشوائية (RAM) التي يفقد ما بها من معلومات عند انقطاع التيارالكهربائى . لذلك ننصح المستخدم بتسجيل المسائل المحلولة أولا بأول باستخدام الأمر Copy بالصورة الآتية :

```
C:\CADS\A > COPY *.* A:
```

ثم نضغط Enter للإدخال . مع مراعاة أن تكون الاسطوانة الموجودة فى المشغل A فارغة .

تهيئة البرنامج للعمل (Configuration) :

بعد الأنتهاء من نسخ ملفات البرنامج على الاسطوانة الصلبة أو المرنة أو القرص التخيليى يلزم تهيئة البرنامج والمقصود بها :

١- تعريف المكونات الصلبة (Hard ware) للبرنامج وهى :

أ- نوع مشغلات الأقراص المرنة أو الصلبة .

ب- نوع الشاشة المستخدمة .

جـ- نوع الطابعة المستخدمة .

بالإضافة إلى وسائل مساعدة أثناء تشغيل البرنامج كاصدار اشارات صوتيه تحذيرية عند الخطأ أو عند ادخال البيانات .

ويستخدم الملف CONFIG.EXE لتهيئة البرنامج ولابد من وجودة مع ملفات البرنامج فى الإسطوانة الصلبة أو المرنة أو القرص التخيليى نكتب الأمر :

```
B:\> CONFIG
```

أو

```
C:\> CONFIG
```

فتظهر لنا الشاشة الآتية :

```
USER    : TITLE .........
          ADDRESS ..........
          ADDRESS .........
          ADDRESS/PHONE...
```

SYSTEM : I.B.M XT/AT with 10/20 Mb fixed disk and 1 flopp disk drive
program.......... DRIVE a
Data disk .... DRIVE C
Floopy disk .... DRIVE A

SCREEN : Colour display/Monochrome display emulating colour
Graphics Supported
Screen Aspect Ratio = .4167.

SOUND : Sound on ERRORS only

PRINTER : IBM/Epson dot-matrix compatible printer
Normal print mode (10 cpi)
Graphics printout supported printer Aspect Ratio = .31

IS THIS CONFIGURATION CORRECT ? Y/N (Press Y or N)

ويوجد فى السطر الأخير سؤال هل المكونات الصلبة للجهازالمستخدم وامكانية اصدار الصوت منه صحيحة أم تحتاج لتغير .

ولنفترض أنها غير صحيحة فنضغط N فتظهر لنا الشاشة التالية :

SELECT THE OPTION YOU WITH TO ALTER :

1- User Enter correct your name and address:- this is used as part of the title on printout
2- System specify the type of disk drives on your machine, and nom inate those you wish the program to Use
3- Screen Specify the type of monitor and graphics card which you are using in your maching
4- Sound Select the sound prompts that the program will give you when it requires input and when it detects an error by the user
5- Printer Specify the type of printer you are using with the program
6-All Review all the above aptions sequentially

ESC-ESCAPE Return to display of current confiquration
Press 1 , 2 , 3 , 4 , 5 , 6 or ESC

والسطر الأخير به الأرقام من [١]إلى [٦] ثم زر الهروب ESC للعودة إلى الشاشة السابقة .

فمثلا عند اختيار الرقم [١] فهو لتغير بيانات المستخدم للبرنامج .

أو أختيار الرقم [٢] فهو لتعديل مشغلات الأقراص المستخدمة والمناسبة لجهاز المستخدم . فعندما نضغط [٢] تظهر لنا الشاشة الآتية :

```
Select system type
1- I.B.M PC.AT with twin double-sided disk drives .
2- I.B.M. XT/AT with 10/20 MB fixed disk and 1 disk drive
press 1 or 2.
```

نختار أى من الأختيارين فمثلا في حالة استخدام مشغلى اسطوانتين مرنتين احدهما ٣٦٠ ك ب والأخرى ٧٢٠ ك ب نختار رقم [١] .

نضغط [١] فتظهر لنا الشاشة الآتية :

```
I.B.M. PC/AT with twin double-sided disk drives
FROGRAM drive letter = A
DATA drive letter = B

Correct Y/N  (Press Y or N )
```

وتم تعريف مشغل قرص حماية البرنامج (Security disk) بأنه المشغل A ثم نضغط Enter .

وتعريف المشغل B بأنه يحتوى علي ملفات البرنامج اللازمة للتشغيل وكذلك البيانات وملفات الحل ثم نضغط Enter ثم Y لتسجيل البيانات السابقة .

أمـا فـى حـالة اسـتـخـدام اسـطوانة مـرنة واحـدة وسـعـة ٣٦٠ ك ب واسطوانة صـلبه (Hard disk) أو اسـطوانـة واحـدة سـعـة ٣٦٠ ك ب والـقـرص التخـيلى (Virtual disk) نختار رقم [٢] وندخل التعريفات الأتية :

```
I.B.M. XT/AT with 10/20 Mb fixed disk and one floppy drive

PROGRAM drive letter = a
DATA drive letter = C
FLOPPY drive letter = A
Correct Y/N (Press Y or N)
```

نضغط Y لتسجيل البيانات السابقة بعد الضغط على Y فى أى من الحالتين تظهر لنا الشاشة الرئيسية مرة أخري ويلاحظ ظهور تعديلات فى اسماء مشغلات الأقراص المستخدمة لتشغيل البرنامج .

وفى حالة تعديل نوع الشاشة المستخدمة نضغط N ثم [3] 3-screen فتظهر لنا الشاشة الأتية :

```
Monitor Selection
Do you have a COLOUR monitor Y/N (Press Y or N)
```

وفى حالة استخدام شاشة احادية اللون نضغط N أما إذا كانت ملونة نضغط Y .

فنفرض أنها احادية بالضغط على N تظهر لنا الشاشة التالية :

```
MONOCHROME SCREEN
Select type of adaptor :
1- IBM Monochrome Display adaptor (no graphics supported)
2- Hercules graphics card/compatible adaptor (720 x 348 graphics
   resolution)
3- Colour display emulation adaptor ( 640 x 200 graphics resolution)
4- Multigraph Display adaptor configured to Monochrome Graphics 1
   (720 x 348 graphics resolution)


Press 1 , 2 , 3 or 4
```

يختار المستخدم نوع الشاشة المناسبة له وذلك بالضغط على[١] أو [٢] أو [٣] أو [٤] ويجيب عن نوع الاختيارات المتوافقة مع الشاشة وتظهر له الشاشة التالية :

ويها نسبة ظهور الرسومات على الشاشة والطابعة

GRAPHICS ASPECT RATIO

The aspect ratio is the ratio of y units to x needed to provide equal length in both directions. It should be adjusted to suit your monitor and your (graphics) printer (if applicable).

Typical approximate values are :

0.6667 (Monochrome 720 x 384 pixel graphics display)

0.62 (I.B.M / Epson compatible dot matrix printer)

Screen Aspect Ratio : .6667

Printer Aspect Ratio : .62<

نضغط Enter فتظهر لنا الشاشة الرئيسية .

فى حالة استخدام شاشة ملونة نضغط Y فتظهر لنا الشاشة التالية :

COLOUR MONITOR SELECTION	0.BLACK
Enter reference no.s from	1. BLUE
table shown right.	2. GREEN
	3. CYAN
	4.RED
	5.MAGENTA
	6.BROWN
	7. WHITE
	8.GREY
	9.LIGHT BLUE

10. LIGHT GREEN
11.LIGHT CYAN
12. LIGHT RED
13. LIGHT MAGENTA
14.YELLOW
15. HIGH INTENSITY WHITE

NORMAL background colour (0 to 7) - 5
NORMAL foreground colour (0 to 15) - 7
REVERSE background colour (0 to 7) - 7
REVERSE for eground colour (0 to 15) - 5
Surrounding border colour (0 to 7) - 5

ويتم اختيار الوان الخلفية والكتابة والبراويز تبعا لرغبة المستخدم نضغط Enter فتظهر لنا الشاشة التالية :

This is an example screen

0 Option No. 0
1 Option No. 1
2 Option No.2
3 Option No. 3

This is the prompt line

Graphics supported

Colour Display or Monochrome display emulating colour

Are these colous / options acceptable Y.N (press Y or N)

ويلاحظ أن الألوان المختارة ، تظهر على الشاشة كعينة ولكى يقبلها أو يعدل فيها المستخدم نضغط Y للموافقة فتظهر لنا الشاشة التالية :

GRAPHICS ASPECT RATIO

The aspect ratio is the ratio of Y units to X needed to provide equal length inboth directions. It should be adjusted to suit your monitor and your (graphics) Printer (if applicable) .

Typical approximate values are :

0.41667 (Colour monitor/colour compatible card)

0.3 (I.B.M / Epson compatible dot matrix printer)

Screen Aspect Ratio : .41667

Printer Aspect Ratio : .31<

4- نضغط Enter مرتين للعودة للشاشة الرئيسية نضغط N ثم 4 لتعديل الصوت sound فتظهر لنا الشاشة التالية وبها اختيارات الصوت عند ادخال البيانات أو الأخطاء أو كلاهما معا أو الغاء الصوت .

Select Sound Options

1- Sound on input and errors

2- Sound on errors only

3- No Sound

Press 1 , 2 or 3

بالضغط على [١] أو [٢] تظهر لنا الشاشة التالية وبها نغمة الصوت المطلوب

ERROR sounds :

Press 1 to hear BOO-BOO sound

Press 2 to hear FANFARE sound

Press 3 to hear WARBLER sound

Press 4 to hear RED ALERT sound

Press 5 to make selection from above sounds

نضغط Enter للعودة للشاشة الرئيسية

نضغط N ثم 5 لتعديل نوع الطابعة 5-Printer فتظهر لنا الشاشة التالية :

Select printer type :
1- IBM / Epson compatible dot-matrix printer
2- C.Itoh / ACT writer 10 , 12 or 20 dot-matrix printer
3- Any other standard ASCII printer
Press 1 , 2 or 3

نختار نوع الطابعة المناسبة ثم نضغط Enter للعودة للشاشة الرئسية فيظهر سؤال في إسفل الشاشة لتسجيل التعديلات ولذلك نضغط Y ثم مسطرة المسافات space Bar فتحفظ في الملف Disk . ID وبذلك تم تهيئة البرنامج تبعاً لنوع الجهاز المستخدم وإمكانياته وللعودة لنظام التشغيل نضغط (N)

الباب الثالث

إدخـــال البـيانـــات

احداثيات نقاط المنشآ Joint Positions

اعضاء المنشآ وحالة الوصلات

Member location and Fixity

الخواص الإنشائية للقطاعات والأعضاء

Properties

الركائز Supports

الأحمال Loads

احداثيات نقاط المنشا Joint Positions

إن تحديداحداثيات نقاط المنشا هي الخطوة الأولى والأساسية لادخال بيانات صحيحة للبرنامج ويمكن استخدام الاحداثيات الكارتيزية والنسبية لذلك .

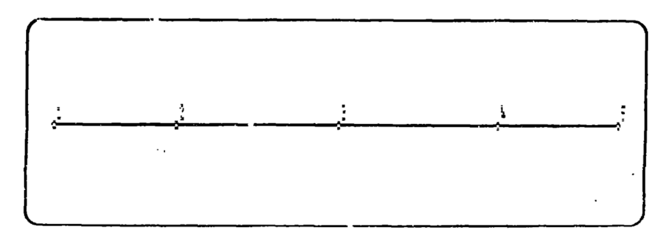
الاحداثيات الكارتيزية :

* نفترض ان أحد نقاط المنشا هى نقطة الاصل (صفر ، صفر) والمحور السينى (X- axis) موجب فى الاتجاه اليمين والمحورالصادى (Y- axis) موجب في الاتجاه لاعلى.

* ترقم نقاط المنشا بحيث يكون الفرق بينهما اقل ما يمكن (١ ، ٢ ، ٣ ، ٤ . . . وهكذا) .

* يحسب الاحداثي السينى والصادى لكل نقطة فى المدى من – ٩٩٩٩ متر حتى +٩٩٩٩ متر .

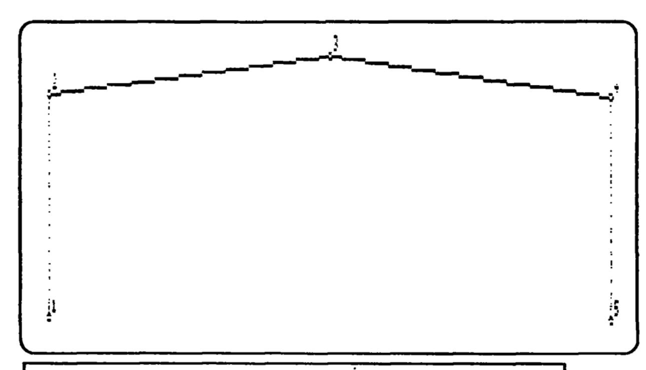
مثال كما بالرسم كمرة مستمرة مرتكزة على خمس مساند (Supports) ومطلوب احداثيات نقاط الكمرة .



Joint Coordinates

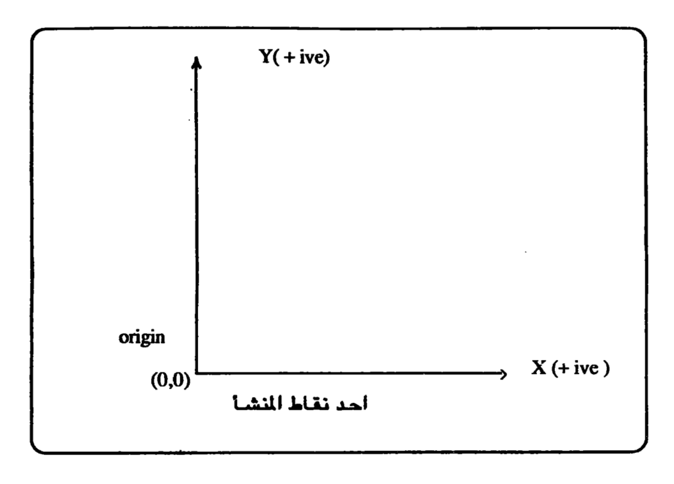
Joint	X(m)	Y(m)
1	0	0
2	3	0
3	7	0
4	11	0
5	14	0

مثال كما بالرسم اطار هيكلى (Frame) ومطلوب احداثيات نقاط الاطار .



Joint	X(m)	Y(m)
1	0	0
2	0	6
3	10	7
4	20	6
5	20	0

ملاحظة : يمكن أختيار المحور السينى والصادى عند أى نقطة من نقاط المنشا مع مراعاة قاعدة الاشارات الموضحة بالرسم .



الاحداثيات النسبية (Relative Coordinates) :

* يفترض ان احد نقاط المنشا المعلومة الاحداثيات (السينى والصادى) هى نقطة الاساس (Reference Joint) .

* تنسب إليها نقطة أو النقاط التالية بمعلومية أى من الآتى:

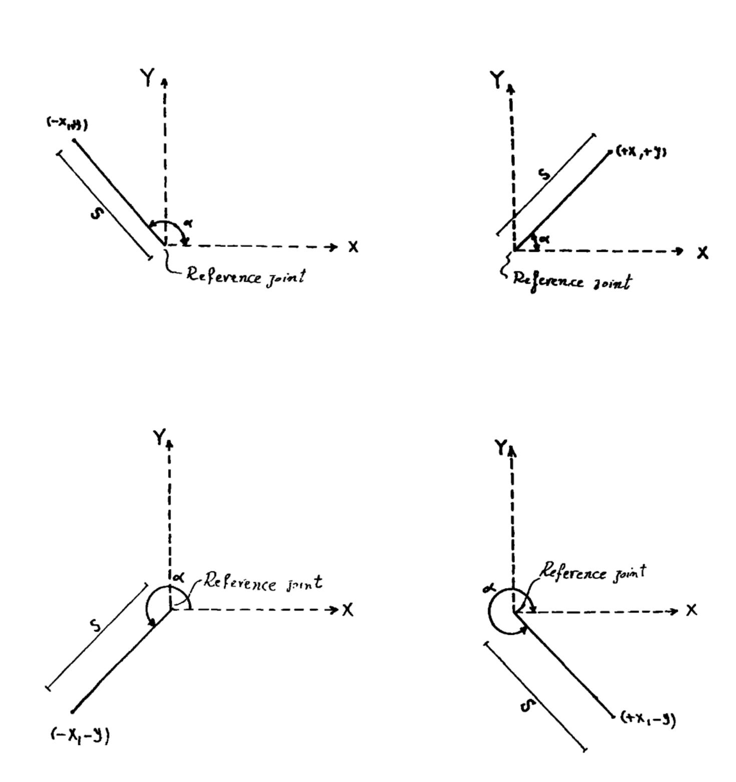
١ـ المسافة الأفقية والرأسية X & Y offsets .

٢ـ المسافة الافقية وزاوية الميل X & Angle .

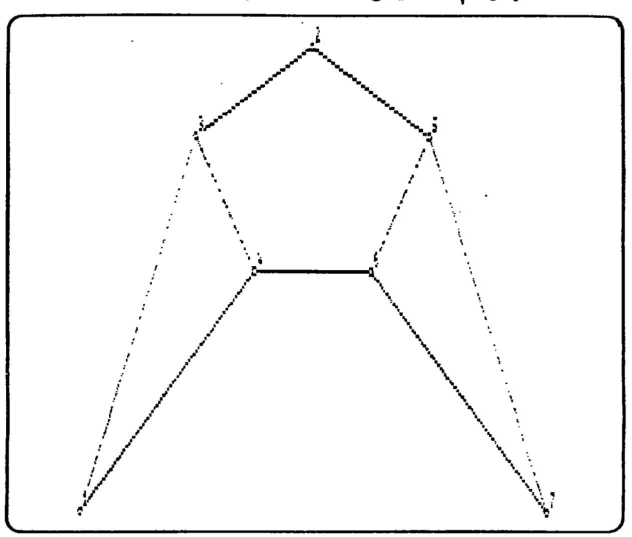
٣ـ المسافة الرأسية وزاوية الميل Y & Angle .

٤ـ المسافة المائلة وزاوية الميل Slope length & Angle .

والاتجاهات الموجبة للمحاور وزاوية الميل موضحة بالرسومات التالية:



مثال كما بالرسم أطار هيكلى (Frame) ومطلوب احداثيات نقاط الاطار :



Joint	Reference Joint	Relative method	X(m)	Y (m)
1	-	-	0	0
2	1	X= 10 m , Y=15	10	15
3	2	X = -5 , A= 210	5	12.113
4	3	Slope=5, A=300 •	7.5	7.783
5	3	X=10 , Y=0	15	12.13
6	5	Slope=5 , A=240 •	12.5	7.783
7	1	X=20, Y=0	20	0

الاحداثيات المتكررة Joints pattern repeat :

يمكن استخدام هذه الخاصية فى حالة المنشاءات ذات الابعاد المتكررة فى اتجاه المحور الافقى أو الرأسى أو فى أى اتجاه مائل ولاستخدامها نتبع الخطوات الآتية:

١ـ أختيارالنقطة أو النقاط التي يمكن التكرار على اساسها (Pattern repeat) .

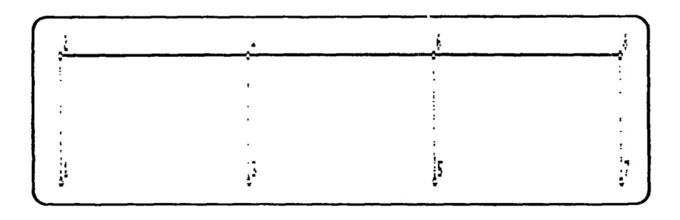
٢ـ ادخال الاحداثيات الافقية والراسية للنقطة أو النقاط السابقة (Coordinates) .

٣ـ ادخال أساس المتوالية العددية اللازم لترقيم النقاط (Joint incrcment) .

٤ـ ادخال عدد مرات التكرار (Number of repeats) .

٥ـ ادخال اتجاه التكرار وقيمته (Value & direction of repeat) .

مثال كما بالرسم اطار هيكلى (Frame) ومطلوب احداثيات نقاط الاطار .



١ـ ادخال احداثيات النقطتين ١ ، ٢ وهما علي الترتيب (صفر ، صفر) ، (٠ ، ٥) م .

٢ـ يمكن حساب قيم الاحداثيات الافقية والراسية لنقاط المنشأ بتكرار النقطتين ١ ، ٢ كما بالرسم .

٣ـ اساس المتواليه العددية هو ٢ أى ترقيم آخر نقطة من نقاط التكرار .

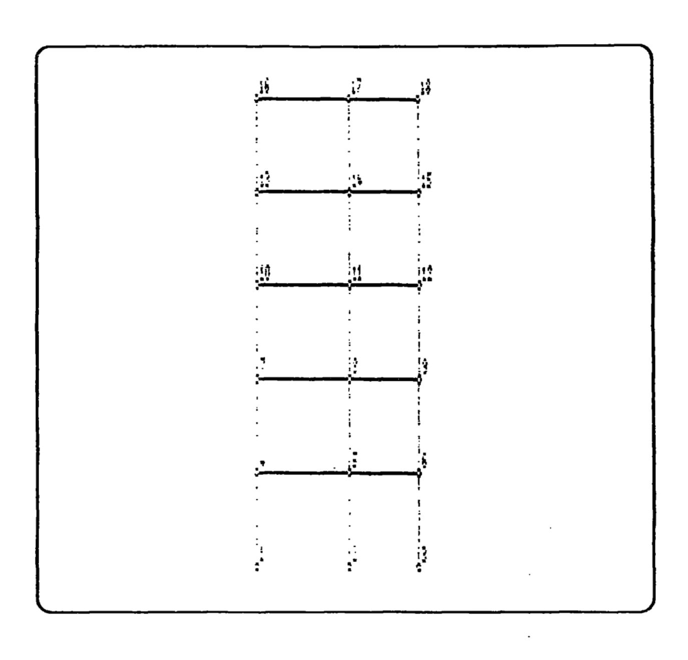
٤ـ عدد مرات التكرار ثلاثة مرات .

٥ـ قيمة التكرار = ١٠ م وفى اتجاه المحور الافقى (س = ١٠ ، ص = صفر) .

وبعد ادخال البيانات السابقة يحسب البرنامج قيم الاحداثيات الافقية والراسية لجميع نقاط المنشأ بمعلومية نقطتى الاساس ١ ، ٢ وهي :

Joint	X(m)	Y(m)
1	0	0
2	0	5
3	10	0
4	10	5
5	20	0
6	20	5
7	30	0
8	30	5

مثال كما بالرسم اطار هيكلى (Frame) ومطلوب احداثيات نقاط الاطار.



١ـ ادخال احداثيات النقاط ١، ٢، ٣ وهلى على التوالى (٠ ، ٠) ، (٤ ، ٠) ، (٧ ، ٠) .

٢ـ يمكن حساب قيم الاحداثيات الافقية والراسية لنقاط المنشأ بتكرار النقاط ١ ، ٢ ، ٣ في الاتجاه الراسى كما بالرسم .

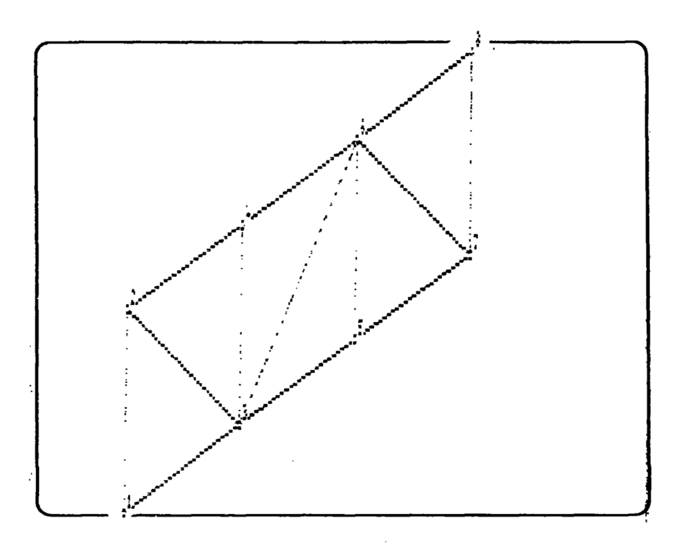
o16	o17	o18
o13	o14	o15
o10	o11	o12
o7	o8	o9
o4	o5	o6
o1	o2	o3

٣ـ اساس لمتوالية العددية هو ٣ أى ترقيم آخر نقطة من نقاط التكرار .

٤ـ عدد مرات التكرار خمس مرات .

٥ـ قيمة التكرار ٣ م وفى اتجاه المحور الراسى (س = صفر ، ص = ٣م) وبعد ادخال البيانات السابقة يحسب البرنامج قيم الاحداثيات الافقية والراسية لجميع نقاط المنشأ بمعلومية نقاط الاساس ١ ، ٢ ، ٣ .

مثال كما بالرسم جمالون (Truss) ومطلوب احداثيات نقاط الجمالون



٣- اساس المتوالية العددية هو ٢ أي ترقيم أخر نقطة من نقاط التكرار .

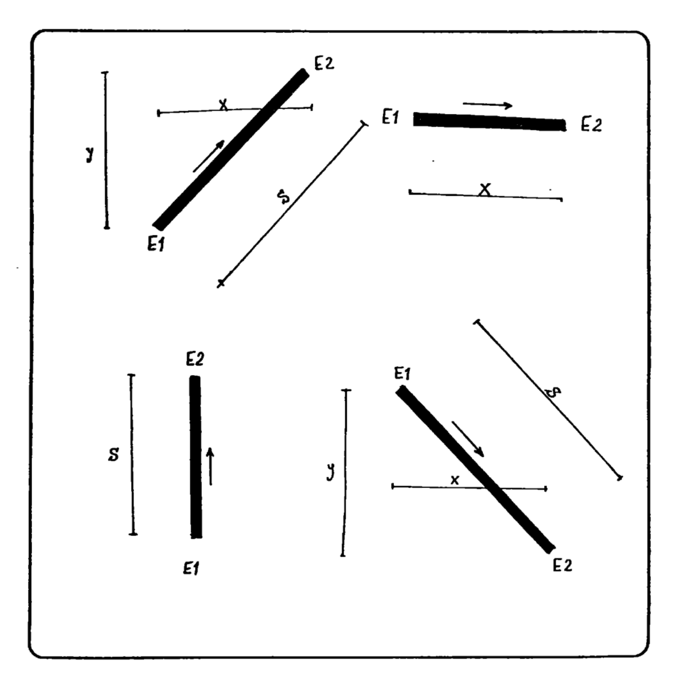
٤- عدد مرات التكرار ثلاثة مرات .

٥- قيمة التكرار (س = ٣م ، أ= ٣٠°) أو (ص = ٤ م ، أ = ٣٠°) . وبعد ادخال البيانات السابقة يحسب البرنامج قيم الاحداثيات الافقية والراسية لجميع نقاط المنشأ بمعلومية احداثيات نقطتى الاساس ١ ، ٢ ويمكن استخدام الطول المائل المتكرر المتساوى (Slope) وزاوية الميل في حساب احداثيات نقاط المنشأ .

اعضاء المنشا وحالة الوصلات Member Location and Fixity

١ - اعضاء المنشا Members :

بعد الانتهاء من حساب ترقيم واحداثيات نقاط المنشأ يجب ادخال الاعضاء المكونة له وكل عضو يسمى (Member) ويصل بين نقطتين فقط من نقاط المنشأ (2-Joints) واحدة عند النهاية الأولى (E1) والأخرى عند النهاية الثانية (E2) مع مراعاة ان تكون النهايتين طبقا للرسم وبدون أى تعديل من مستخدم البرنامج

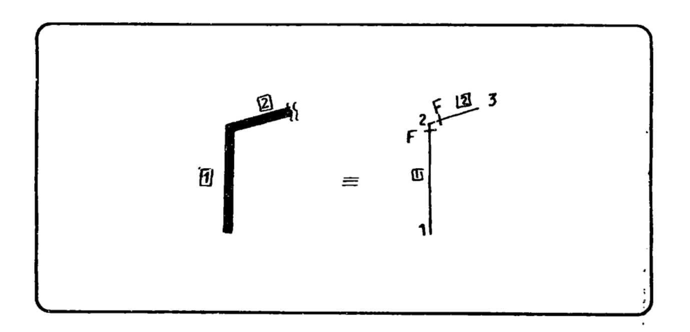


ولابد من ادخال اعضاء المنشا بنفس ترتيب النهايات الموضحة بالرسم السابق .

٣- حالة الوصلات Fixity :

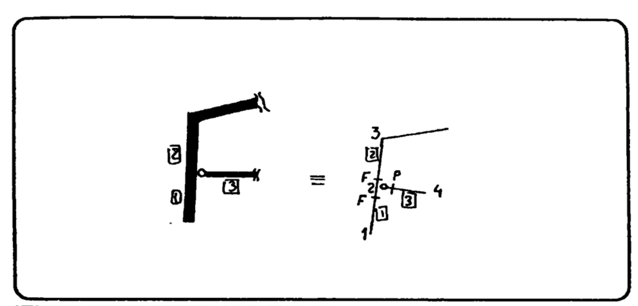
عند ادخال أى عضو (Member) بالمنشأ تعرف النهايتان بالترقيم وحالة النهاية هل هى صلبة (Fixed) ويرمز لها بالحرف (F) أو مفصلة ويرمز لها بالحرف (P) فمثلا عند وجود :

* وصلة (Fixed) فى اطار هيكلى Frame يعرف العضوان ١ ، ٢ كالاتى :



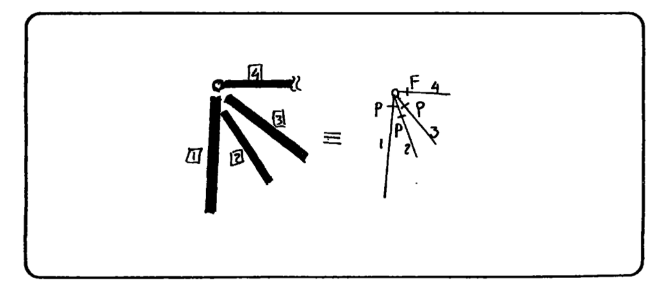
Member	E1	Jt cond.	E2	Jt cond
1	1	F	2	F
2	2	F	3	F

* وصلة صلبة (Fixed) فى اطار هيكلى (Frame) وبها عضو (Hinged) تعرف الاعضاء ١ ، ٢ ، ٣ كالاتى :



Member	E1	Jt cond.	E2	Jt cond
1	1	F	2	F
2	2	F	3	F
3	2	P	4	P

* وصلة مفصلة (Pinned) فى جمالون (Truss) تعرف الاعضاء ١ ، ٢ ، ٣ ، ٤ كالاتى كلها مفصلة (P) ما عدا أى عضو منهم لا بد أن يكون F وهذا شرط اساسى لاتزان الوصلة والتأكد من صحة ادخال الوصلة فإن مجموع العزوم عندها = صفر .



∴ مجموع العزوم = ع١ + ع٢ + ع٣ + ع٤ = صفر

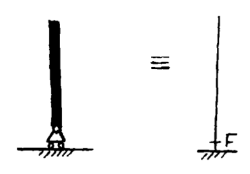
∴ ع١ = ع٢ = ع٣ = صفر

∴ ع٤ = صفر

∴ الوصلة تحقق الشرط انها مفصلة (Hinged - Pinned)

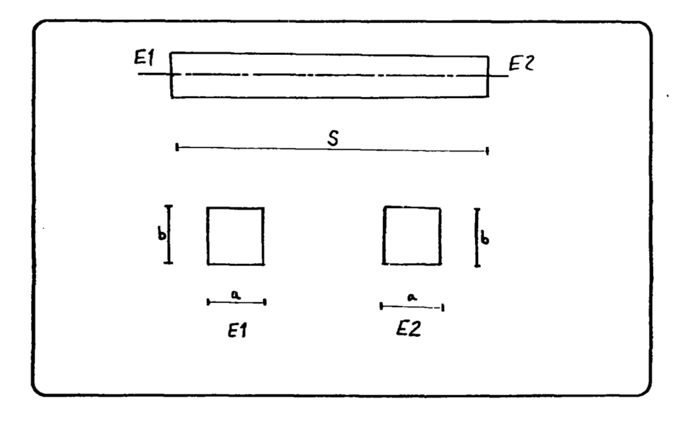
* وصلة مع الركائز (Supports) :

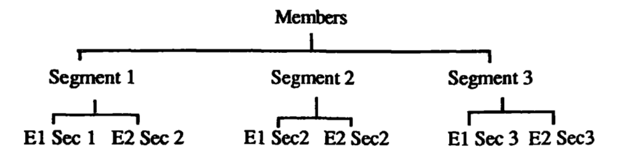
فى هذه الحالة لا بد أن نطبق قاعدة البرنامج وهي وجود F واحدة على الاقل عند كل وصلة وهنا وصلة العضو مع الركيزة لابد أن تكون (F) وسنوضح كيفية تعريف الركيزة على أنها (Fixed - Hinged - Roller) فيما بعد بفصل الركائز (Supports)

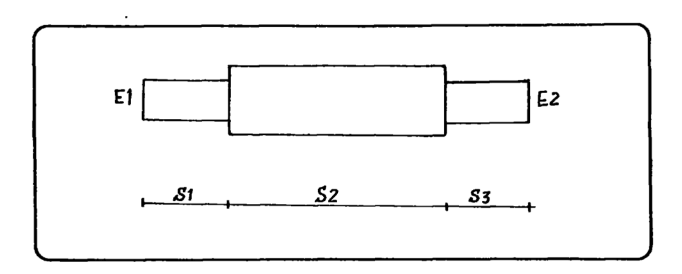


الخواص الإنشائية للقطاعات والاعضاء Properties :

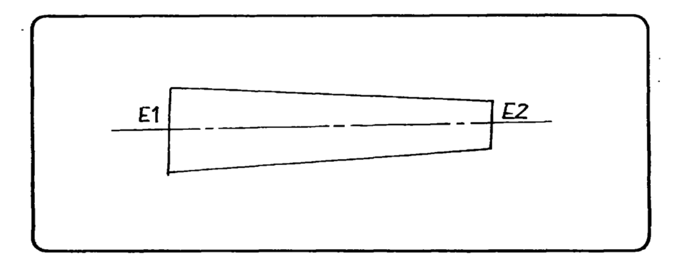
ويجب الآن ادخال خصائص القطاعات والاعضاء ويتعامل البرنامج مع الاعضاء المنتظمة وغير المنتظمة المقطع (كما بالرسم) فالنهاية الاولي توجد فى اقصى اليسار (E1) والنهاية الثانية (E2) فى أقصى اليمين للعضو (Member) ويمكن تقسيمه إلى اجزاء Segments ولا يشترط أن يكون لها نفس الطول وتبدا بقطاع (Section) وتنتهى بقطاع (Section) .



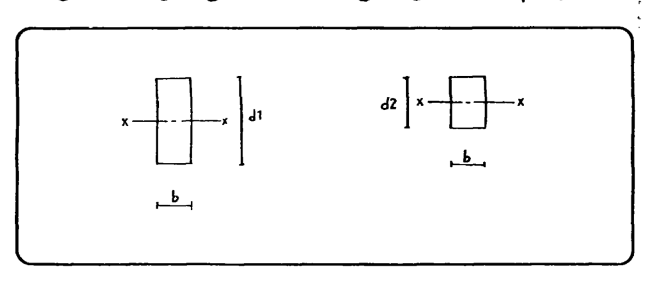




مثال عمود لاطار هيكلى (Frame) غير منتظم المقطع كما بالرسم :



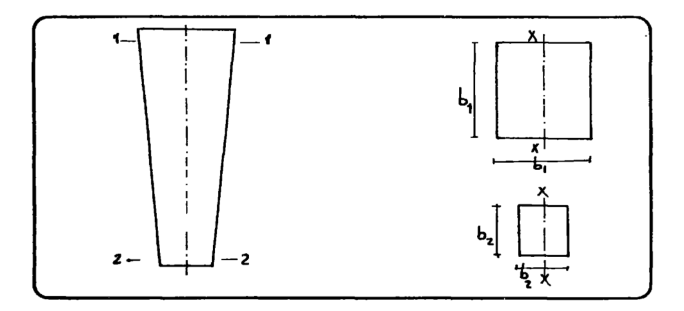
ويحسب عزم القصور الذاتى للقطاع الاول Sec 1 والقطاع الثانى Sec 2 كالاتى :



$$I1 = \frac{b\ d^3 1}{12} \quad , \quad I2 = \frac{b\ d^3 2}{12}$$

محور x - x تدور حوله عزوم الانحناء (Bending Moment) :

مثال : عمود لاطار هيكل (Frame) غير منتظم المقطع كما بالرسم :



ويحسب عزم القصور الذاتى للقطاع الاول Sec 1 والقطاع الثانى Sec 2 كالاتى :

$$I\,1 = \frac{b^4 1}{12} \quad , \quad I\,2 = \frac{b^4 2}{12}$$

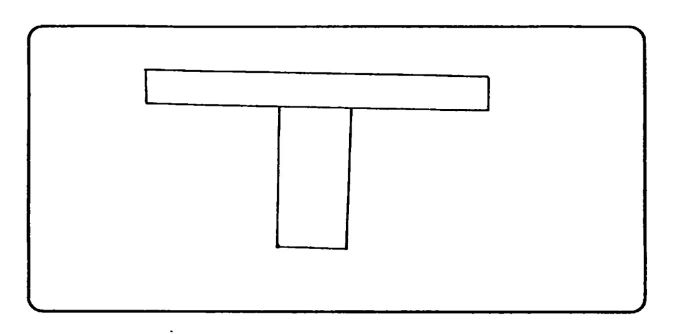
وبذلك أمكن تعريف العضو الغير منتظم المقطع من نهايته الاولى إلى الثانية . (Non Prismatic)

وفى حالة انتظام المقطع من النهاية الاولى إلى الثانية يعرف العضو على انه منتظم المقطع Prismatic .

ويلاحظ فى بعض الاعضاء الانشائية يكون القطاع علي هيئة T-sec, I-sec ويمكن للبرنامج توصيف ذلك القطاع وحساب مساحته وعزم القصور الذاتى له مباشرة عن.

طريق تقسيم القطاع (Section) إلى عناصر (Elements) ولكل عنصر ندخل الطول والعرض .

مثال : قطاع علي هيئة (T-sec) كما بالرسم :

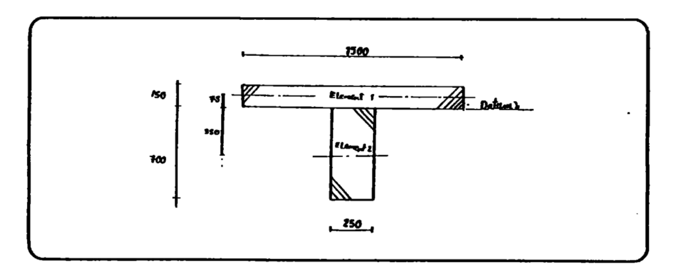


١ـ نختار أى محور أفقى لننسب له بعد مركز الثقل للعناصر المختلفة (Datum) .

٢ـ نقسم القطاع إلى عناصر مستطيلة المقطع .

٣ـ ندخل الطول والعرض وبعد مركزه الثقل بالنسبة للمحور الاختيارى Datum .

٤ـ يتم حساب المساحة وعزم القصور الذاتى للقطاع مباشرة عن طريق البرنامج .



Element	Y mm	b mm	d mm
1	75	1500	150
2	-350	250	700

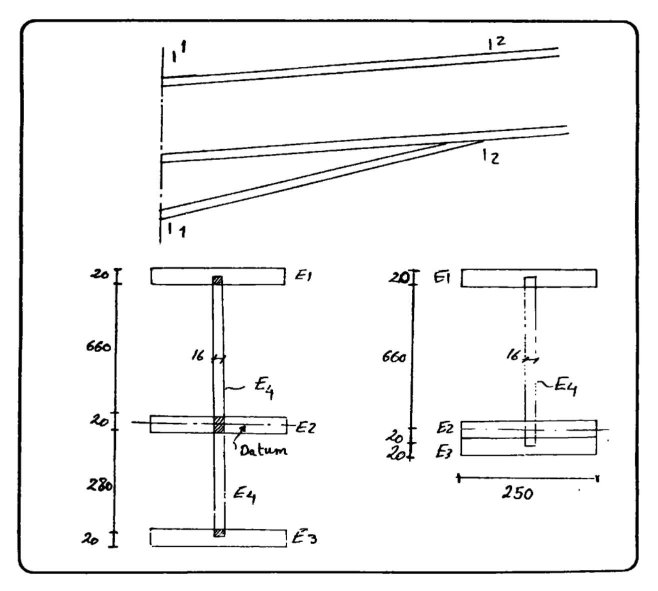
وبذلك نحصل على خصائص القطاع باستخدام البرنامج مباشرة وبدون أى حسابات من المستخدم

Area = 4000 cm^2

Inertia = 875880 cm^4

ويمكن للبرنامج توصيف قطاعات واعضاء المنشآت الحديدية Steel Structures

مثال جزء من كمرة عند اتصالها بالعمود الراسى لاطار هيكلى (Frame) .



١ـ نختار المحور الافقى عند منتصف العنصر الثانى (Datum) .

٢ـ تم تقسيم القطاع إلى اربعة عناصر عند القطاع الكبير Sec 1 والصغير Sec 2 مع مراعاة ان كل عنصر هو نفسه فى القطاعين حتى لو تلاشى واصبح غير موجود نفرض طوله أو عرض = صفر وبذلك تصبح مساحته وعزم القصور الذاتى له = صفر أى أنه غير موجود .

وايضا لابد أن يكون المحور الافقى (Datum) فى القطاعين في نفس الموضع أى عند منتصف العنصر الثانى .

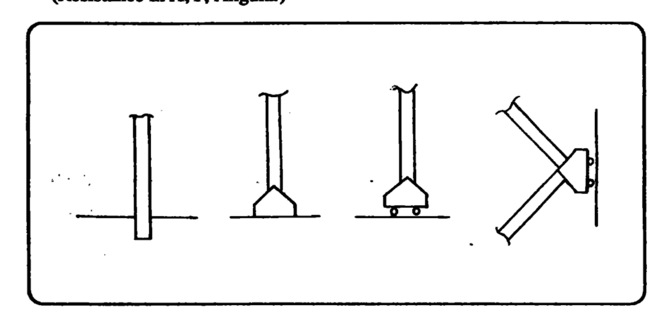
والجدول الاتى يوضح القيم المطلوبة لحساب المساحة وعزم القصور للقطاعين بواسطة البرنامج وبدون أى حسابات من المستخدم .

Sec 1				Sec 2			
Element	y	b	d	Element	y	b	d
1	680	250	20	1	680	250	20
2	0	250	20	2	0	250	20
3	-300	250	20	3	-20	0	20
4	200	16	960	4	350	16	660

ويهمل التداخل بين العصب (Web) والفلنشة (Flange) الوسطى فى حساب المساحة وعزم القصور الذاتى للقطاع في الحالتين .

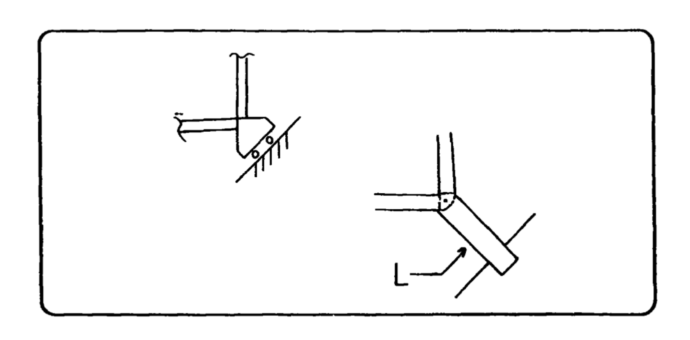
الركائز : Supports

بعد ادخال الشكل الهندسي للمنشأ علي هيئة نقاط (Joints) وأعضاء (Members) وكذلك الخواص الانشائيه له (Properties) يلزم تعريف الركائز (Supports) ويتم ذلك على أساس مقاومتها للحركة فى الاتجاه الأفقى والرأسى والدوران
(Resistance in X,Y, Angular)



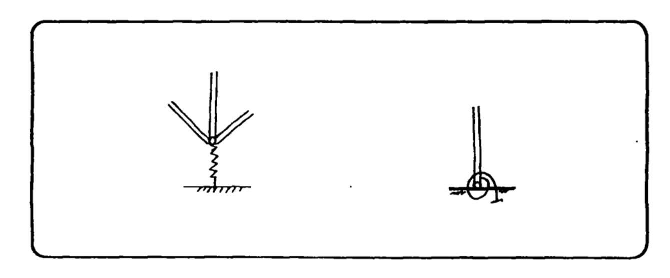
Support Resistance	Fixed	Hinged	VL Roller	HZ.Rroller
X-direction	Full (F)	Full (F)	Zero	Full (F)
Y-direction	Full (F)	Full (F)	Full (F)	Zero
Angular Direction	Full (F)	Zero	Zero	Zero

وكما نعلم فى حالة الدعامة التي تسمح بالحركة المستقيمة (Roller) إذا كانت في وضع مائل كما بالشكل فيلزم فرض عضو غير مؤثر (Dummy) طوله ل وندخل كافة بيانات هذا العضو كأى عضو عادى .



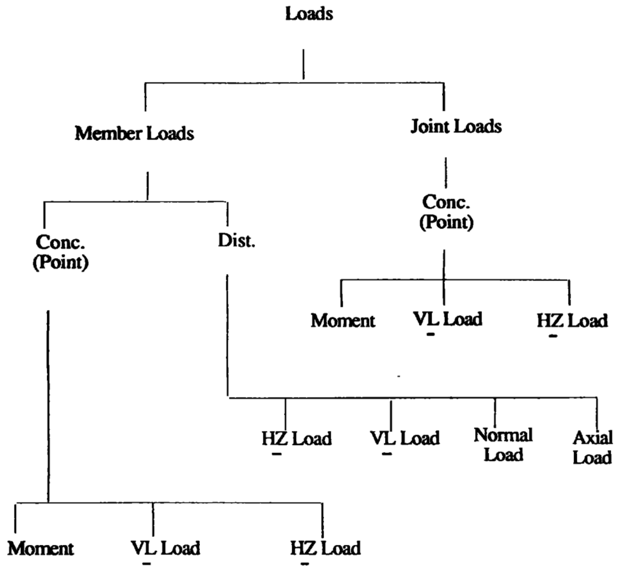
ولجعل رد الفعل (Reaction) فى اتجاه عمودى على السطح المائل تفرض قيمة كبيرة لمساحة العضو مثلا ١ × ١٠^٩ سم ٢ لأنها تتحمل القوى المحورية (Normal Force) أما عزم القصور الذاتى فيعطى قيمة صغيرة ١×١٠^-٩ سم٤ لانه يتحمل عزوم الانحناء وبذلك يتمكن القطاع من تحمل القوى العمودية (Normal Force) وفى اتجاه عمودى على السطح المائل أى أن رد الفعل يصبح لركيزة (Roller) .

ويسمح البرنامج أيضا بادخال الركائز المرنه Elastic Supports مثل الزنبرك (Spring) وتعطى قيمة لمقاومة الركيزة فى أى اتجاه وهى تعبر عن القوة اللازمة لتحريكها في هذا الاتجاه بمقدار وحدة أطوال أو دوران .



الاحمال Loads

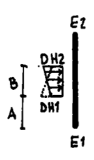
بعد الانتهاء من ادخال الركائز نبدأ في تعريف الاحمال للبرنامج. وفي البداية يجب ان نتعرف على انواع الاحمال المختلفه وهى

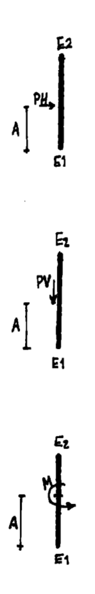


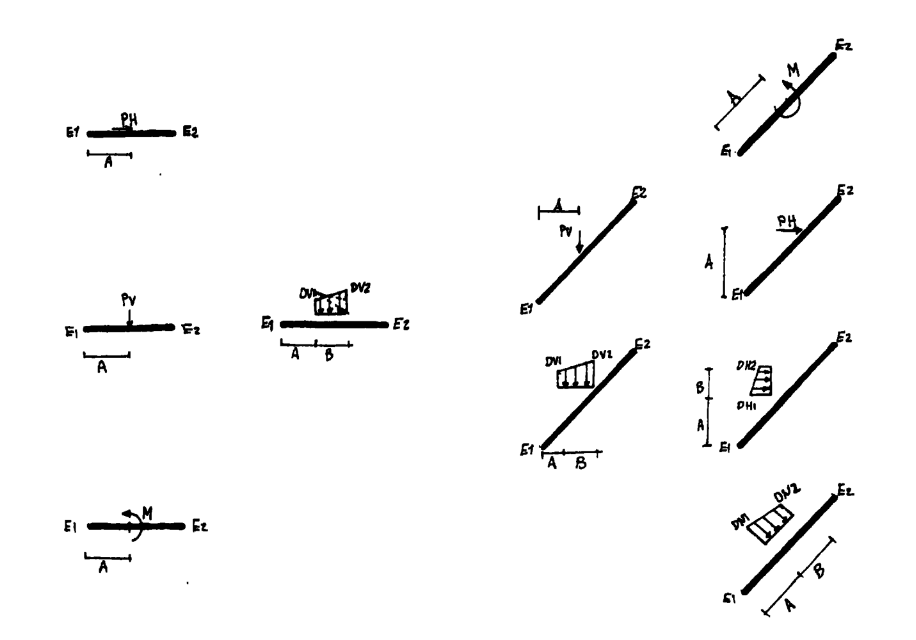
وبعد ذلك نعد البيانات الاتية

١ ـ تسميه كل الاحمال المتوقعة على المنشأ (Dead Load, Live Load,...)

٢ ـ تحديد الاحمال المتوقعة على كل عضو بالمنشأ (Member Loads) مقدار واتجاه ونطاق التأثير او على كل نقطة بالمنشأ (Joint Loads) مع مراعاة الاشارات الموجبة الموضحة بالرسم


E2
DH2
DH1
B
A
E1


E2
PH
A
E1
E2
PV
A
E1
E2
M
A
E1


E1
E2
PH
PV
M
A
B
DV1
DV2
DH1
DH2

ونلاحظ الاتى :ـ

ـ الاحمال الرأسية موجبة فى الاتجاه لاسفل (Vertical Loads)

ـ الاحمال الافقية موجبة فى الاتجاه لليمين (Horizontal Loads)

ـ الاحمال العمودية على طول العضو موجبة عندما يكون عزمها حول النهاية الاولى (E1) للعضو فى اتجاه عقرب الساعة (Normal Loads)

ـ الاحمال المحورية موجبة عندما تتجه للنهاية الاولى (Axial Loads)

ـ العزوم موجبة فى عكس اتجاه عقرب الساعة (Moments)

ـ يرمز بالحرف (A) للبعد بين نقطة تاثير الحمل المركز والنهاية الاولى(Point Load)

ـ يرمز بالحرف (A) للبعد بين بداية تاثيرالحمل الموزع (Piont Load) والنهاية الاولى(E1) والطول المؤثر يرمز له بالحرف (B)

ـ يؤثر الحمل الموزع (Dist Load) على طول العضو بالكامل أو جزء منه وله قيمتان عند النهايةالاولى (E1) والنهايةالثانية (E2)

ـ يعرف الحمل الموزع بانتظام (Uniform Dist. Load) بانه يؤثر على طول العضو بالكامل وله قيمة واحدة عند النهاية الاولى (E1) والثانية (E2)

الباب الرابع

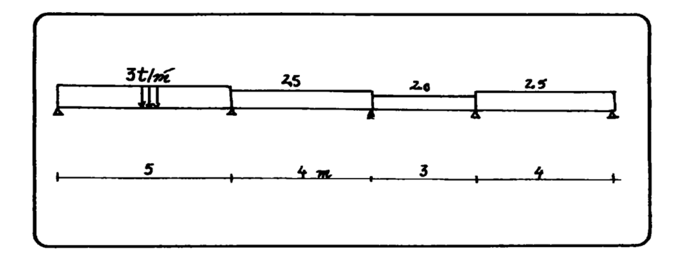
أمثلة عملية

أمثله عملية

بعد الانتهاء من إتقان الخطوات الأساسية للبرنامج والتي تم شرحها في الأبواب السابقه نبدأ في حل الأمثلة التالية بالتفصيل وباستخدام الحاسب الشخصى مع شرح تفصيلى كامل لكل منها :

١ - المثال الأول :

كمرة مستمرة (Continuous beam) وعليها أحمال موزعة بانتظام (uniform distributed load) كما بالرسم :



– خطوات الحل :

١– بعد تحميل البرنامج نضغط [Y] للاستمرار فتظهر لنا الشاشة الاتيه :

0 End program
1 Start New Job
2 Reselect Previous Job
3 Disk Utilites

4 Job Size check

Before running a job for the first time, seclect option 3 from the above menu, then make a data disk and backup copies of the program disk(s).

Key option required

F1 F2 NUMLOCK

Help Calc is ON

٢- نضغط [١] للبدء فى ادخال بيانات منشأ جديد 1 Start new Job فتظهر لنا الشاشة التالية:

Start a new job

Ensure that the ANALYSE Secunity Diskette is in the floppy drive

This disk must not be removed whilst the job is in progress or the program will stop and the data just entered will be lost.

Press 1 when ready to continue, or ESC to escape to the main menu

F1 F2 NUMLOCK

HELP CALC is ON

والغرض منها التأكد من وجود (Security diskette) فى المشغل (A or B) .

٣- نضغط (١) للاستمرار فتظهر لنا الشاشة التالية :

```
List of jobs on disk
NO JOBS ON DATA DISK



Enter new job reference (1 to 6 chars)
Job Reference = 0
(Press ESC to escape)

F1          F2                                   NUMLOCK
help        Calc                                   is ON
```

وبها اسماء المنشات السابقة التى تم حلها .

* **ملاحظة هامة :**

فى حالة ادخال اسطوانه غير (Security diskette) لن نستطيع التعامل مع البرنامج فى أي خطوة بعد ذلك وهي اساسيه ولابد من وجودها دائما فى المشغل الخاص بها ولا يمكن الاستغناء عنها لتشغيل البرنامج من البداية إلى النهاية ولا تخرج من المشغل الخاص بها إلا بعد الأنتهاء من استخدام البرنامج .

٤- ندخل اسم المنشأ وليكن (Beam) بحيث لا يزيد عن سته أحرف وفي حالة الرغبة فى العودة للشاشة السابقة نضغط [Esc] وبعد ادخال الاسم نضغط [Enter] .

Job Reference = Beam

فتظهر لنا الشاشة التالية :

```
List of Jobs on disk          49 Kb space free
NO JOBS ON DATA DISK
```

```
Enter new job reference (1 to 6 chars)
Job Reference = BEAM
Correct     Y     N
F1          F2                         NUMLOCK
Help        Calc                        is ON
```

والموافقة علي الاسم نضغط [Y] ولتغيرالاسم نضغط [N]

Correct [Y] [N]

٥- نضغط [Y] فتظهر لنا الشاشة التالية :

```
Current job refenence = BEAM
0 End this job
1 Joint Positions



Key option required



F1          F2                         NUMLOCK
Help        Calc                        is ON
```

بالضغط على [0] تنهي هذا المنشأ بدون ادخال اى بيانات

أما بالضغط على [1] ندخل نقاط المنشأ [1] Joint Positions .

٦- نضغط [1] فتظهر لنا الشاشة التالية :

```
Joint positions
Jt.    X coord    Y coord
No.      (m)        (m)
1   0.000<



Input mode
F1    F2    F6    F7    F8    F9        F10     ESC     NUMLOCK
Help  Calc  Top   Up    Down  Commnd    Bottom  Escape   is ON
```

السطر الأول به عنوان الشاشة نقاط المنشأ Joint positions

والثانى به رقم كل نقطة سيتم ادخال احداثياتها Jt NO .

وأيضا الاحداثى السينى (X coord) والصادى (Ycoord) ووحدة الأطوال هى المتر .

وفى اسفل الشاشة توجد مربعات عليها ارقام مفاتيح الوظائف بلوحة المفاتيح (F1 , F2 , F6 , F7 , F8 , F9 , F10)

فبالضغط على [F1] فى أى لحظة تظهر شاشات المساعدة وللرجوع لشاشة الادخال نضغط [Esc] .

ويلاحظ ان شاشات المساعدة تتوافق المعلومات الموجودة بها مع شاشة الادخال فمثلا هنا توضح شاشات المساعدة قواعد ادخال احداثيات نقاط المنشأ .. وهكذا .. وللتنقل بين شاشات المساعدة نضغط [F3] للوصول إلي أى صفحة ، [F4] للرجوع صفحة للخلف ، [F5] للرجوع للفهرس ، [F6] للتقدم صفحة للامام ، [ESC] للعودة لشاشة ادخال انقاط المنشأ .

وبعد هذه الجوله السريعة نبدأ فى ادخال احداثيات نقاط المنشأ وهى :

JT	X	Y
1	0	0
2	5	0
3	9	0
4	12	0
5	16	0

* ويلاحظ أن الموشر المضئ عند النقطة رقم (١) وينتظر اعطاء الاحداثى السينى (X) لها وقيمته (صفر) ثم نضغط [Enter] للادخال . ندخل قيمة الاحداثى الصادى (Y) وقيمته (صفر) ثم نضغط [Enter] للأدخال .

* وبنفس الطريقة ندخل احداثيات النقطة (٢) وهى (٥ ، صفر) وهكذا حتى النقطة (٥) وهى (١٦ ، صفر) .

* ولتعديل قيم الاحداثيات نستخدم [F6] للوصول إلى قمة البيانات أو البداية ، [F7] للوصول إلى الخانة الأعلي ، [F8] للوصول إلي الخانة الأسفل ، [F10] للوصول إلى نهاية البيانات .

٧- بعد الأنتهاء من ادخال الاحداثيات تظهرلنا الشاشة التالية :

```
Joint positions
Jt.     X cord     Y cord
No       (m)        (m)
1       0.000      0.000
2       5.000      0.000
3       9.000      0.000
```

4	12.000	0.000
5	16.000	0.000
6	0.000	

Input mode

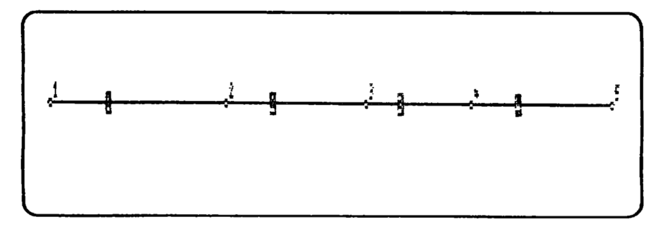
F1	f2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

٨- نضغط [ESC] لتسجيل احداثيات نقاط المنشأ فتظهر لنا الشاشة التالية :

Current Job referecnce = BEAM   48Kb Disk space free

0 End this job
1 Joint Positions
2 Member Locations & fixity
D Draw the Structure

٩- نضغط [2] لادخال بيانات أعضاء المنشأ(Member Location & Fixity) الموضحة بالرسم:



فتظهر لنا الشاشة التالية :

```
Member location and fixity
Mem   J1.  Jnt X1  Coord   Y1 Coord 12 . Jnt  X2 Coord Y2 Coord Length Slope
No    no.  con     (m)           (m)  no. con  (m)   (m)    (m)       (m)  (deg)
1  0<



Inpout mode

F1     F2    F6    F7    F8     F9       F10     ESC    NUMLOCK
Help  Calc  Top   Up   Down  Commnd  Bottom  Escape     in ON
```

وطبقا لقواعد ادخال الأعضاء الموضح صفحة (٥٣) فعند النقطة (١) لابد من وجود عضو واحد على الأقل له خاصية (Fixed) (F) وبذلك فالنهاية الأولى (F) وعن النهاية الثانية يتولد عزم سالب (negative moment) فلابد من وجود (F) أيضا وهكذا تم توصيف أعضاء المنشأ الموضحة بعالية .

نعود مرة أخرى لادخال البيانات فالسطر الأول به العنوان أعضاء المنشأ وخصائص وصلاتها (Member Location and Fixity) والثاني يوضحه رقم العضو (Memb. NO) ورقم نقطة البداية له (J1.NO) ونوع الوصلة عندها (Jnt. Con) والاحداث السينى لها (X1 coord) والاحداثى الصادى لها (Y1 Coord) ثم رقم نقطة النهاية له (J2. NO) ونوع الوصله عندها (Jnt. con) والاحداثى السينى (X2 Coord) والاحداثى الصادى لها (Y2 coond) ثم طول العضو (Length) ، وميله (Slope deg) ويمكن إدخال نيانات اعضاء المنشأ كالآتى :

Member	J1	J1.con	J2	J2.Con
1	1	F	2	F
2	2	F	3	F
3	3	F	4	F
4	4	F	5	F

ونعود مرة أخري لادخال البيانات للبرنامج فيلاحظ وجود المؤشر عند بيانات العضو الأولي (Member 1) وينتظر اعطاء رقم النهاية الأولي له وهي نقطة (١) (Joint1) ثم حالتها (F) وللموافقة نضغط [Enter] فتظهرعلى الشاشة احداثيات النقطة (١) تلقائيا (صفر . صفر) ثم ندخل النهاية الثانية وهى نقطة (٢) (Joint2) وحالتها (F) وللموافقة نضغط (Enter) فتظهر احداثيات النقطة (٢) على الشاشة تلقائيا ثم طول العضو (Length) وميله Slope وبنفس الطريقة ندخل باقى أعضاء المنشأ حتى العضو الرابع والأخير فتظهر الشاشة التالية :

Member Location and fixity

Mem No.	J1. no	Jnt Con	X1Coord (m)	Y1Coord (m)	J2 no	Jnt con	X2Coord (m)	Y2coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	5.000	0.000	5.000	0.000
2	2	F	5.000	0.000	3	F	9.000	0.000	4.000	0.000
3	3	F	9.000	0.000	4	F	12.000	0.000	3.000	0.000
4	4	F	12.000	0.000	5	F	16.000	0.000	4.000	0.000
5	5									

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	up	down	commnd	Bottom	Escape	is ON

ملاحظة : عند حدوث أى أخطاء فى إدخال بيانات الاعضاء نستخدم مفاتيح الوظائف (Function Keys) الموجودة أسفل الشاشة للتصحيح وهى [F6] للوصول إلى بداية البيانات و [F7] للصعود لاعلى و [F8] للهبوط لاسفل و [F10] لنهاية البيانات .

وبعد الأنتهاء من تعديل البيانات نضغط [ESC] للتسجيل فتظهر لنا الشاشة التالية :

```
Current Job reference = BEAM     47 kb Disk space free

0  End this job
1  Joint positions
2  Member locations & fixity
3  Properties
D  Draw the Structure



Key option required

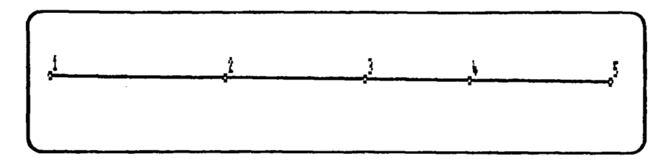


F1     F2                                         NUMLOCK
Help   Calc                                         is ON
```

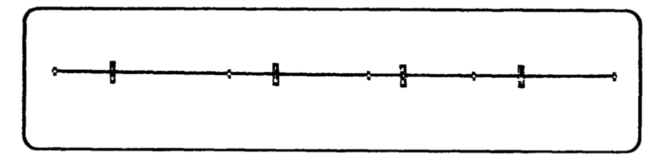
١٠ـ نضغط [D] (Draw the structure) لشاهدة رسم المنشا والتأكد من ابعاده ونقاطه واعضائه فتظهر لنا الشاشة التالية :

وبها كمره مستمرة وعند كل نقطة تظهر دائرة صغيرة وهى ليست مفصلة (Hinge) ولكن البرنامج يرسم كل Joint على هيئة دائرة صغيرة بصرف النظر عن حالتها إن كانت (Hinged) أو (Fixed) نستخدم مفاتيح الوظائف الموجودة اسفل الشاشة .

فمثلا نضغط [F4] ثم [F3] لاظهار نقاط المنشأ (Joints) على الرسم



أو نضغط [F4] ثم [F4] لاظهار اعضاء المنشأ (Members) على الرسم



أو نضغط [F4] ثم [F5] لاظهار نقاط واعضاء المنشأ (Joints & Members) على الرسم والعودة للشاشة الأولى بالرسومات نضغط [ESC] .

نضغط [F3] ثم [F4] للعودة للشاشة الأولى بدون أى ترقيم للنقط والاعضاء .

نضغط [ESC] ثم Y للعودة للشاشة الرئيسية

١١ـ نضغط [3] لادخال خصائص قطاعات واعضاء المنشأ (properties) فتظهر لنا الشاشة التالية :

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	0.000		

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	down	commnd	Bottom	Escape	is ON

ويوجد بالسطر الأول العنوان وهو جدول قطاعات اعضاء المنشأ (Table of sections) والسطر الثـانى به قطاع رقم (١) (Section No1) والمساحة (Area Cm2) وعزم القصور الذاتى (Inertia Cm4) وعدد العناصر المكونة للقطاع (No of Elements) .

نفرض أن قطاع الكمرة المستمرة ثابت وهو ٢٥سم × ٤٠ سم مثلا فتكون المساحة = ١٠٠٠ سم٢ وعزم القصور الذاتى = ١٣٣٣٣٣ سم٤ .

نستخدم مفاتيح الوظائف الموجودة اسفل الشاشة نضغط [F9] (Command) ثم [F6] (Member) لتوضيح قطاعات كل عضو من اعضاء المنشأ فتظهر لنا الشاشة التالية:

Table of Section Member Section Properties

Section No	Area (cm2)	Inertia (m4)	No. of Elements	Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	1000.000	133333.33	0	1	5.000	P	1	1	21000
2	0.000			2	4.000	P	1	1	21000
				3	3.000	P	1	1	21000
				4	4.000	P	1	1	21000

input mode

F1	F2	F6	F7	F8	F9	F10	SEC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is On

يوجد بالسطر الأول خصائص قطاعات الأعضاء (Member Section Properties) ورقم العضو (Member NO) وطول العضو (Member Length) ونوع المقطع (N/P) هل هو منتظم المقطع (Prismatic) أو غير منتظم المقطع (non prismatic) وعدد اقسام العضو الغير منتظم المقطع (No. Seg) ورقم القطاع الخاص بالعضو وتم ادخال كل القطاعات فى الجزء الايسر من الشاشة (Sec.No.) ثم معامل ينج بوحدة (N/mm2) ولتحويله إلى المعامل الخاص بالخرسانة نقسم على المعامل ١٠ : ١٥ .

نضغط (P) لجعل العضو الأول منتظم المقطع (Prismatic) من النهاية الأولى حتي النهاية الثانية فتظهر عدد الاقسام (NO.Seg) بقيمة = ١ وبعد ذلك ندخل رقم القطاع (Sec.NO.) بقيمة = ١ وهو موجود فى يسار الشاشة المساحة = ١٠٠٠ سم٢ (Area) وعزم القصورالذاتى = ١٣٣٣٣٣سم٤ (Inertia) ونعدل قيمة معامل ينج من الحديد

(٢١٠٠٠٠ نيوتين/مم٢) إلى الخرسانة بالقسمة على (١٠-١٥) وتصبح قيمة معامل ينج من ١٤٠٠٠ - ٢١٠٠٠ نيوتن /مم٢ ندخل نفس القطاع لباقى الاعضاء حتى الرابع والاخير.

ملاحظة : نستخدم زر الادخال [Enter] للموافقة على القيم السابقة فى كل مرة للتعديل فى أى بيانات نستخدم مفاتيح الوظائف الموجودة أسفل الشاشة نضغط [ESC] للتسجيل فتظهر الشاشة التالية :

```
Current Job reference = BEAM      47 Kb Disk space free

0  End this job
1  Joint Positions
2  Member locations & fixity
3  Properties
4  Supports
D  Draw the Structure
```

نضغط [٤] لادخال الركائز (Supports) فتظهر الشاشة التالية :

```
Supports
No.  Jnt  X  Restraint     Y  Restraint       A  Restraint
     Pos     (Kn/nm)        (KN/mm)            (KNm/rad)
1     0




Input mode

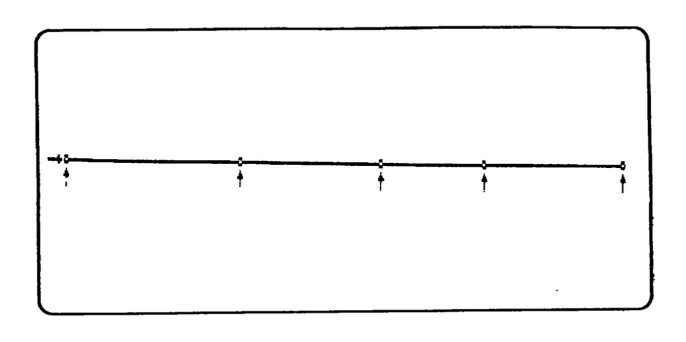

F1     F2    F6    F7    F8        F9        F10      ESC      NUMLOCK
Help   Calc  Top   Up    Down  Commnd   Bottom   Escape     is ON
```

يوجد بالسطر الأول العنوان وهو الركائز (Supports)

والسطرالثاني به رقم الركيزة (.No) الاولى والثانيه وهكذا ورقم نقطة المنشا المناظرة لرقم الركيزه فمثلا J2 هي الركيزة رقم ١ وهكذا ثم مقاومةالركيزة فى الاتجاه الافقى (X restraint) والاتجاه الرأسى (Y Restraint) والدوران(A restraint) .

ندخل نوع الركائز طبقا للجدول التالى وكما بالرسم :

Support	NO	Jnt Pos	X Restraint	Y Restraint	A Restraint
Hinge	1	1	Full	Full	Zero
Roller	2	2	Zero	Full	Zero
Roller	3	3	Zero	Full	Zero
Roller	4	4	Zero	Full	Zero
Roller	5	5	Zero	Full	Zero



ونستخدم حرف (F) لتعريف (Full) و (Z) لتعريف (Zero) فتظهر لنا الشـاشة التالية:

```
Supports
No  Jnt   X Restraint   Y Restraint   A Restraint
    Pos   (KN/mm)       (KN/mm)       (KNm/rad)
1    1      Full          Full          Zero
2    2      Zero          Full          Zero
3    3      Zero          Full          Zero
4    4      Zero          Full          Zero
5    5<     Zero          Full          Zero


Inpout mode

F1    F2    F6   F7   F8     F9       F10     ESC      NUMLOCK
Help  Calc  Top  Up   Down  Commnd   Bottom  Escape    is ON
```

نستخدم مفاتيح الوظائف الموجودة في أسفل الشاشة لتعديل أى بيانات نضغط [ESC] للتسجيل فتظهر لنا الشاشة التالية :

```
Current job reference = BEAM.                47Kb  Disk space free
0  End this job
1  Joint Positions
2  Member locations & fixity
3  Properties
4  Supports
5  Load  case name
D  Draw the Structure
```

يمكن الآن ادخال الاحمال المؤثرة علي الكمرة المستمرة نبدأ فى ذلك كالاتي :

ـ نسمى كل الاحمال المتوقعة على المنشا ([5] Load case names) مثل الحمل الميت (Dead Load) والحى(Live Load) والرياح (wind load) . . . الخ .

والسهولة نفرض ان الحمل الموزع بانتظام على الكمرة المستمرة هو حمل ميت (Dead Load) .

١٢ـ نضغط [5] فتظهر الشاشة التالية :

```
Global load case names

No.    load Case  Name
1           Dead Load
```

```
Input mode


F1   F2   F6   F7   F8   F9   F10   ESC   NUMLOCk
Help  Calc  Top  Up  Down  Commnd  Bottom  Escape  is ON
```

يوجد بالسطر الأول العنوان وهو اسماء الاحمال المؤثرة علي المنشا (Global load case names).

والسطر الثانى به اسم الحمل ورقمه (No., Load Case name) ويظهر دائما الحمل الميت (Dead Load) فى السطر الثالث ولا يمكن اهماله .

نضغط [ESC] للتسجيل والموافقة علي وجود الحمل الميت فقط . فتظهر الشاشة التالية:

```
Current job reference = BEAM

0 End this job
1 Joint Positions
2 Member locations & fixity
3 Properties
4 Supports
5 Load Case names
6 Member loads
7 Joint loads
D Draw the Structure


Key option required
```

F1 F2	NUMLOCK
Help Calc	is On

لتعريف الأحمال المختلفة المؤثرة على الاعضاء نضغط [6] (6 Member Loads) .

لتعريف الأحمال المختلفة المؤثرة علي نقاط المنشأ نضغط [7] (7 Joint Loads) .

ويلاحظ أن الحمل المؤثر علي الكمرة المستمرة من النوع الأول نضغط [6] فتظهر الشاشة التالية :

MEMBER LOADS

Mem No.	No. of Loads
1	0
2	0
3	0
4	0

Command mode

F1	F2	F3	F4	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Go to :	Delete	Up	Down	Input :	Print :	Escape	is ON

يوجد بالسطر الأول العنوان وهو الأحمال المؤثرة على الأعضاء (Member Loads) .

السطر الثانى به رقم العضو وعدد الاحمال المؤثرة عليه (Mem No., No. of Loads)

١٢ـ ندخل الاحمال باستخدام مفاتيح الوظائف الموجودة اسفل الشاشة نضغط [F9] (Input) فتظهر الشاشة التالية :

```
MEMBER LOADS
Mem      No of
No.      Loads
1          0
2          0
3          0
4          0



Enter applied loads and moments
On which Member  ? 0
(Press ESC to escape)

F1      F2                                        NUMLOCK
Help    Calc                                        is ON
```

ويوجد سؤال فى اسفل الشاشة وهو عن رقم العضو المطلوب تعريف الاحمال المؤثرة عليه . نبدأ بادخال الاحمال المؤثرة علي العضو الأول (Member 1) .

ندخل رقم العضو وقيمته = ١ ثم نضغط [Enter] للادخال فتظهر الشاشة التالية :

```
MEMBER LOADS Loads & moments on Member 1 (length= 5.000m
slope = 0.000deg)
 Mem  No.of   Ld.   Load Case          Load   Start    Loaded   (KN. KN.m or KN/m)
 No   Loads   No.   Number&name        Type   Pos(m)   Len(m)   Start val. End val
 1      0     1     1  Dead Load       UV                       30.000
 2      0     2     1
 3      0
 4      0

 Transfer loads to other Members ? Y/N
```

يوجد بالسطر الأول العنوان وهو الاحمال المؤثرة علي الاعضاء (Member Loads) والاحمال والعزوم المؤثرة على العضو الأول (Loads & Moments on Momber) وكذلك طوله وميله(Length = 5m , slope = 0.00 deg) .

السطر الثانى به رقم العضو ثم عدد الاحمال المؤثرة عليه (No of Loads) ثم رقم الحمل (Ld.No) ورقم الحمل واسمه (Load case Number & name) وسبق تعريفها في الخطوة السابقة (5 Load case names) ويوجد نوع الحمل (Load Type) وبداية نقطة تأثيرة (Start pos m) وطول التحميل (Loaded Length m) وقيمته عند النهاية الأولى (Start Val.) وعند النهاية الثانية (End Val.) بوحدات كيلو نيوتن ، متر ويجب مراجعة قواعد ادخال الاحمال جيدا الموجودة صفحة (٦٥) .

نستخدم مفاتيح الوظائف الموجودة في اسفل الشاشة لتعريف نوع الحمل الميت (Dead load) فمثلا نضغط [F3] (Point Load) لادخال حمل يؤثر فى نقطة (Concentrated load) وعلى أى بعد من نهايته الاولى .

ولادخال عزم مؤثر فى نقطة من العضو الاول وعلى أى بعد من نهايته الأولى نضغط (Moment) [F4] .

ولادخال وزن المتر الطولى من العضو الاول نضغط [F5] (Self wt) ولادخال حمل موزع يؤثر بانتظام (Uniform distributed load) نضغط [F6] (U.D.LD) .

ولادخال حمل موزع (مثلث أو شبه منحرف) (Distrib. Load) نضغط (DISTRIB) [F7] .

وبمراجعة الاحمال الميته المؤثرة علي الكمرة المستخدمة فالعضو الاول عليه ٣ طن /م موزعة بانتظام (U.D.ld) من النهاية الاولى (Jt1) إلى النهاية الثانية (Jt2) .

وهناك ملاحظة هامة يعرف الحمل الموزع بانتظام (U.D.LD) بانه يبدأ من النهاية الأولى وينتهى عند النهاية الثانية للعضو وبنفس القيمة ولا يصح ان يؤثر علي جزء من العضو وإذا حدث ذلك يعرف الحمل بانه حمل موزع (Distrib) وليس موزع بانتظام
- نضغط [F6] فنلاحظ ظهور حرف (U) وتعنى أن الحمل موزع بانتظام (U.D.L) ونستخدم [F3] لتعريف اتجاه الحمل بانه راسى (Vertical) أو [F4] للاتجاه الافقى أو [F5] للاتجاه العمودى على محور العضو (Normal) أو [F6] فى اتجاه المحور (Axial) .

وطبعا الحمل الموزع بانتظام على العضو الاول اتجاهه راسيا لاسفل أى موجب طبقا لقاعدة اشارات الاحمال الموضحة صفحة (٦٥) أو باستخدام شاشات المساعدة بالضغط على [F1] والعودة لشاشة الادخال باستخدام زر الهروب [ESC] .

- نضغط [F3] (Vertical) ونلاحظ ظهور حرف (V) وتعني حمل موزع بانتظام واتجاهه راسى .

- بالضغط [Enter] ندخل قيمته الحمل وهي ٣ طن/م × ٩,٨١ للتحويل إلي وحدة كيلونيوتن/مَ أى تقريبا ٣٠ كيلو نيوتن/مَ (30 KN/ m) .

والآن تم ادخال الحمل الميت (Dead Load) على العضو الاول .

ـ نضغط [ESC] للتسجيل فيظهر سؤال فى اسفل الشاشة هل نوع وقيمة واتجاه الاحمال المؤثرة علي العضو الثانى مثل الاول فنجيب لا أى نضغط [N] فتظهر الشاشة التالية:

```
MEMBER LOADS
Mem    No.of Loads
1       1
2       0
3       0
4       0


Command mode


F1    F2    F3          F4      F7   F8      F9     F10    ESC      NUMLOCK
Help  Calc  Go to : Delete  Up   Down  Input : Print : Escape    is ON
```

نلاحظ أن عدد الاحمال المؤثرة علي العضو الاول = ١ وهو الحمل الميت (Dead Load) بدلا من (صفر) قبل ادخال هذا الحمل .

ـ نضغط [F9] (Input) الموجودة فى اسفل الشاشة لادخال الاحمال على العضو الثاني حتى الرابع فتظهر الشاشات التالية تباعا :

MEMBER LOADS Loads & moments on Member 2 (length= 4.000 slope=0.000deg)

Mem No	No.of Loads	Ld. No.	load case Number & name	Load Type	Start Pos(m)	Loaded Len(m)	(KN,KN.m or KN/m) Start val.	End val.
1	1	1	1 Dead Load	UV			25.000	
2	0	2	1					
3	0							
4	0							

MEMBER LOADS Loads & moments on Member 3 (length= 3.000 slope=0.000deg)

Mem No	No.of Loads	Ld. No.	load case Number & name	Load Type	Start Pos(m)	Loaded Len(m)	(KN,KN.m or KN/m) Start val.	End val.
1	1	1	1 Dead Load	UV			20.000	
2	1	2	1					
3	0							
4	0							

MEMBER LOADS Loads & moments on Member 4 (length = 4.000 slope=0.000deg)

Mem No	No.of Loads	Ld. No.	load case Number & name	Load Type	Start Pos(m)	Loaded Len(m)	(KN,KN.m or KN/m) Start val.	End val.
1	1	1	1 Dead Load	UV			25.000	
2	1	2	1					
3	1							
4	0							

```
Current job reference = BEAM        64Kb Disk space free

0  End this job
1 Joint positions
2 Member locations & fixity
3 Properties
4 Supports
5  Load case names
6 Member loads
7 Joint loads
8 Combinations
D Draw the Structure
```

ولادخال أى أحمال تؤثر علي نقاط المنشا (Joint Loads) نضغط [7] ويمكن تخطى هذه الخطوة لعدم وجود تلك الأحمال فى المثال الحالى .

ولتعريف حالات التحميل المكونة من الحمل الميت والحي واحمال الرياح . . . الخ .

١٤ـ نضغط [8] فتظهر الشاشة التالية :

```
Safety Factors for combination
Load Case              Safety
Number and name        factor



Enter no. of combinations - max = 428
How many ? O<
(Press ESC to escape)

F1      F2                                      NUMLOCK
Help    Calc                                     is ON
```

يوجد بالسطر الأول العنوان وهو عامل الامان لحالة التحميل (Safety Factors For Combination).

السطر الثانى به رقم الحمل واسمه (Load Case number and name) وعامل الامان (Safety Factor).

وفى اسفل الشاشة تظهر عدد حالات التحميل الممكنة للكمرة المستمرة وهي ٤٢٨ حالة وللسهولة نفترض حالة واحدة وهي الحمل الميت فقط (Dead Load) ومضروبا فى عامل أمان = ١ .

نكتب [١] ثم نضغط [Enter] للادخال فيظهر اسم الحمل الميت (Dead Load)

ندخل عامل الامان = ١ ثم نضغط [Enter] للإدخال كما بالشاشة التالية :

```
Safety Factors for combination   1
Load  Case             Safety
Number and name        factor
1       Dead Load      1.000
```

نضغط [ESC] للتسجيل فتظهر الشاشة التالية :

```
Current job reference = BEAM    45.5K Disk space free

0 End this job
1 Joint Positions
2 Member locations & fixity
3 Properties
4 Supports
5 Load case names
6 Member Loads
7 Joint loads
```

8 Combinations
9 Analysis / Results
D Draw the Structure

وأخيرا تم ادخال كل بيانات المنشأ وهي الابعاد والنقاط والاعضاء والقطاعات والاحمال وحالات التحميل المختلفة والآن يمكن البدء في حل الكمرة .

نضغط [9] فتظهر الشاشة التالية :

Current job reference = BEAM 54.5K Disk space free
0 End this job
1 Revise data
2 View results on screen
3 Print input data and results
D Draw the structure

(NB: Calculations not yet done)

- لانهاء المنشأ بدون حل نضغط [صفر] (0 End this job)

- للعودة لبيانات المنشأ نضغط [١] (1 Revise data)

- للبدء فى حل المنشأ واظهار النتائج على الشاشة نضغط [٢]
(2 View Results on Screen)

- لطباعة بيانات ونتائج المنشأ على الطابعة بعد الحل نضغط [٣]
(3 Print input data and results)

- لرسم المنشأ نضغط [D] (D Draw the strueture) .

والسطر الأخير يوضح ان الحسابات الانشائية للكمرة لم تبدأ بعد
(Calculations not yet done)

١٥- نضغط [٢] للبدء فى الحل فتظهر خطوات الحل علي الشاشة :

Final stiffnes calculations for member (1)

" " " " " (2)

" " " " " (3)

" " " " " (4)

Loading data for member (1)

" " " " (2)

" " " " (3)

" " " " (4)

Calculating result for member (1)

" " " " (2)

" " " " (3)

" " " " (4)

ثم في النهاية تظهر الشاشة التالية :

Current job reference = BEAM
0 Exit to main menu
1 Results (L/4)
2 Summary of Maxima
3 Joint Displacements and Reactions
4 Summations of Forces and Moments
D Draw the structure, Deflections, Moments & Forces

- تظهر بيانات ونتائج المنشأ كالآتى :

Joint positions

Jt. No.	X coord (m)	Y coord (m)
1	0.000	0.000
2	5.000	0.000
3	9.000	0.000
4	12.000	0.000
5	16.000	0.000
6		

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Member location and fixity

Mem No.	J1. no.	Jnt con	X1 Coord (m)	Y1 Coord (m)	J2. no.	Jnt con	X2 Coord (m)	Y2 Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	5.000	0.000	5.000	0.000
2	2	F	5.000	0.000	3	F	9.000	0.000	4.000	0.000
3	3	F	9.000	0.000	4	F	12.000	0.000	3.000	0.000
4	4	F	12.000	0.000	5	F	16.000	0.000	4.000	0.000
5										

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	1000.000	133333.33	0
2			

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	1000.000	133333.33	0
2			

Member Section Properties

Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	5.000	P	1	1	21000.000
2	4.000	P	1	1	21000.000
3	3.000	P	1	1	21000.000
4	4.000	P	1	1	21000.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Supports

No.	Jnt Pos	X Restraint (kN/mm)	Y Restraint (kN/mm)	A Restraint (kNm/rad)
1	1<	FULL	FULL	ZERO
2	2	ZERO	FULL	ZERO
3	3	ZERO	FULL	ZERO
4	4	ZERO	FULL	ZERO
5	5	ZERO	FULL	ZERO

```
Input mode


  F1     F2             F6     F7     F8     F9     F10    ESC           NUMLOCK
 Help   Calc            Top    Up    Down  Commnd Bottom Escape           is ON

Global load case names

No.    Load Case Name
  1         Dead Load
  2
```

```
Input mode


  F1     F2             F6     F7     F8     F9     F10    ESC           NUMLOCK
 Help   Calc            Top    Up    Down  Commnd Bottom Escape           is ON

MEMBER LOADS    Loads & moments on Member 1  (length = 5.000m slope = 0.000deg)
Mem    No.of    Ld.  Load case          Load  Start Loaded  ( kN, kN.m or kN/m )
No.    Loads    No.  Number & name      Type Pos(m) Len(m) Start val.   End val.
  1      1       1   1<       Dead Load UV                     30.000
  2      1       2
  3      1
  4      1
```

```
Input mode
```

```
  F1     F2              F6     F7     F8     F9     F10    ESC          NUMLOCK
 Help   Calc            Top     Up    Down  Commnd Bottom Escape          is ON

MEMBER LOADS   Loads & moments on Member 2  (length = 4.000m slope = 0.000deg)
Mem    No.of   Ld.  Load case          Load  Start Loaded  ( kN, kN.m or kN/m )
No.    Loads   No.  Number & name      Type Pos(m) Len(m) Start val.   End val.
 1       1      1   1        Dead Load UV                     25.000
 2       1      2
 3       1
 4       1
```

```
                 Input mode
```

```
  F1     F2              F6     F7     F8     F9     F10    ESC          NUMLOCK
 Help   Calc            Top     Up    Down  Commnd Bottom Escape          is ON

MEMBER LOADS   Loads & moments on Member 3  (length = 3.000m slope = 0.000deg)
Mem    No.of   Ld.  Load case          Load  Start Loaded  ( kN, kN.m or kN/m )
No.    Loads   No.  Number & name      Type Pos(m) Len(m) Start val.   End val.
 1       1      1   1<       Dead Load UV                     20.000
 2       1      2
 3       1
 4       1
```

```
                 Input mode
```

```
  F1     F2              F6     F7     F8     F9     F10    ESC          NUMLOCK
 Help   Calc            Top     Up    Down  Commnd Bottom Escape          is ON

MEMBER LOADS   Loads & moments on Member 4  (length = 4.000m slope = 0.000deg)
Mem    No.of   Ld.  Load case          Load  Start Loaded  ( kN, kN.m or kN/m )
No.    Loads   No.  Number & name      Type Pos(m) Len(m) Start val.   End val.
 1       1      1   1<       Dead Load UV                     25.000
 2       1      2
```

```
  3        1
  4        1
```

```
                  Input mode


   F1     F2               F6     F7     F8     F9     F10    ESC            NUMLOCK
  Help   Calc              Top    Up    Down  Commnd Bottom Escape           is ON

Safety Factors for Combination  1
Load Case                  Safety
Number and name            factor
  1         Dead Load       1.000
```

```
 Input mode


   F1     F2               F6     F7     F8     F9     F10    ESC            NUMLOCK
  Help   Calc              Top    Up    Down  Commnd Bottom Escape           is ON
==============================================================================
*                            *                               * JOB : BEAM
*----------------------------*-------------------------------*----------------
*                            *                               * DATE:
*                            *                               *----------------
*                            *     I N P U T   D A T A       *SHEET:     1
*-----------------------------------------------------------------------------
*  ANALYSE (C)Copyright Computer and Design Services Limited 1985
==============================================================================
FRAME GEOMETRY

No. of Joints = 5

MEMBERS
```

Mem No.	End 1 Jt. no.	C	X coord (m)	Y coord (m)	End 2 Jt. no.	C	X Coord (m)	Y Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	5.000	0.000	5.000	0.00
2	2	F	5.000	0.000	3	F	9.000	0.000	4.000	0.00
3	3	F	9.000	0.000	4	F	12.000	0.000	3.000	0.00
4	4	F	12.000	0.000	5	F	16.000	0.000	4.000	0.00

TABLE OF SECTIONS

Section Number	Area: (cm2)	Inertia: (cm4)	Rectangular Elements (if specified) No:	D (mm)	B (mm)	Y (mm)
1	1000.00	133333.3				

SUMMARY OF MEMBER PROPERTIES

Member 1 - 4 PRISMATIC : Section Number 1 : Modulus E = 21000.0 N/mm2

SUPPORTS

No. of Supports = 5

Joint Number	X Restraint (kN/mm)	Y Restraint (kN/mm)	Angular Restraint (kN.m/radian)
1	FULL	FULL	ZERO
2	ZERO	FULL	ZERO
3	ZERO	FULL	ZERO
4	ZERO	FULL	ZERO
5	ZERO	FULL	ZERO

APPLIED LOADS AND MOMENTS

MEMBER 1

LOAD CASE No	Name	LOAD: Type	POSITION Start	Length	LOAD / MOMENT Start Value	End Valu(
1	Dead Load	UV			30.000 kN/m	

		JOB : BEAM
		DATE:
	I N P U T D A T A	SHEET: 2

```
=================================================================================
APPLIED LOADS AND MOMENTS continued

MEMBER 2

L O A D   C A S E   :LOAD: P O S I T I O N      : L O A D / M O M E N T
No : Name           :Type:     Start:    Length:    Start Value:      End Value
---:----------------:----:----------:----------:---------------:---------------
  1:      Dead Load: UV :           :          :   25.000 kN/m:
---------------------------------------------------------------------------------
MEMBER 3

L O A D   C A S E   :LOAD: P O S I T I O N      : L O A D / M O M E N T
No : Name           :Type:     Start:    Length:    Start Value:      End Value
---:----------------:----:----------:----------:---------------:---------------
  1:      Dead Load: UV :           :          :   20.000 kN/m:
---------------------------------------------------------------------------------
MEMBER 4

L O A D   C A S E   :LOAD: P O S I T I O N      : L O A D / M O M E N T
No : Name           :Type:     Start:    Length:    Start Value:      End Value
---:----------------:----:----------:----------:---------------:---------------
  1:      Dead Load: UV :           :          :   25.000 kN/m:
=================================================================================
COMBINATIONS

                    : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E   : Combination Number
No : Name           :  1
--------------------:-----
  1:      Dead Load:1.000
=================================================================================
```

```
*---------------------------*---------------------------------*----------------
*                           *                                 * DATE:
*                           *                                 *----------------
* -                         * A N A L Y S I S   R E S U L T S *SHEET:      3
*------------------------------------------------------------------------------
* ANALYSE (C)Copyright Computer and Design Services Limited 1985
================================================================================
```

RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0034	0.000	60.578	0.000
2	0.00	0.00	0.0013	0.000	154.981	0.000
3	0.00	0.00	0.0002	0.000	55.701	0.000
4	0.00	0.00	-0.0007	0.000	97.765	0.000
5	0.00	0.00	0.0015	0.000	40.975	0.000

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-410.000	-3105.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-410.000	-3105.000
Summation	0.000	410.000	3105.000
Summation	0.000	0.000	0.000

Maxima for Member 1

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-89.422	0.000	0.000	61.161	2.019	-72.111	5.000

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	65.559	0.000	0.000	13.848	2.622	-72.111	0.000

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-38.741	0.000	0.000	1.423	1.063	-36.098	3.000

Maxima for Member 4

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	59.025	0.000	0.000	33.580	2.361	-36.098	0.000

		JOB : BEAM
		DATE:
	A N A L Y S I S R E S U L T S	SHEET: 4

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RESULTS FOR COMBINATION 1 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	5.000	-89.422	0.000	-72.111	0.0	0.0	0.074
0.75L	3.750	-51.922	0.000	16.229	0.0	-2.7	0.135
0.50L	2.500	-14.422	0.000	57.695	0.0	-4.7	0.031
0.25L	1.250	23.078	0.000	52.285	0.0	-3.7	-0.120
Jt. 1	0.000	60.578	0.000	0.000	0.0	0.0	-0.197

Maximum +ve Bending Moment 61.161 kN.m at 2.019m from joint 1
Maximum -ve Bending Moment -72.111 kN.m at 5.000m from joint 1

RESULTS FOR COMBINATION 1 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.000	-34.441	0.000	-9.876	0.0	0.0	0.011
0.75L	3.000	-9.441	0.000	12.065	0.0	-0.2	0.005
0.50L	2.000	15.559	0.000	9.007	0.0	0.0	-0.021
0.25L	1.000	40.559	0.000	-19.052	0.0	0.4	-0.015
Jt. 2	0.000	65.559	0.000	-72.111	0.0	0.0	0.074

Maximum +ve Bending Moment 13.848 kN.m at 2.622m from joint 2
Maximum -ve Bending Moment -72.111 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 3

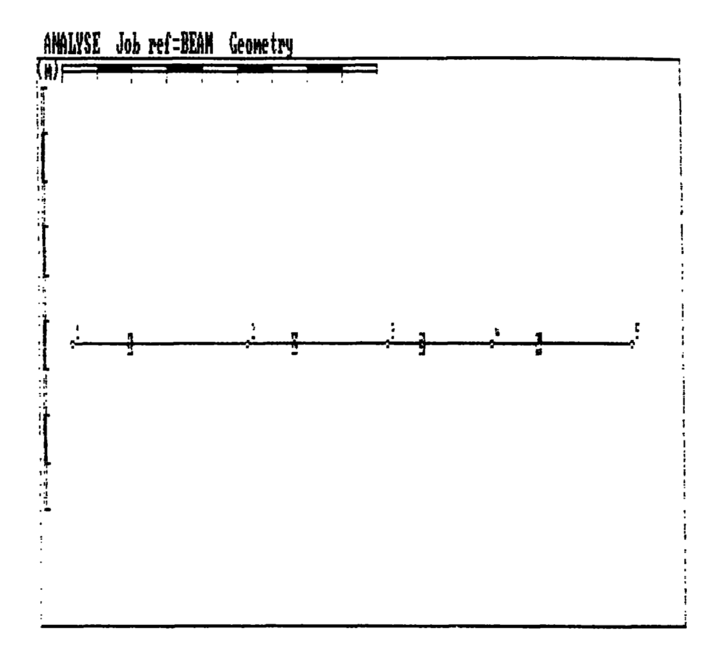
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	-38.741	0.000	-36.098	0.0	0.0	-0.038
0.75L	2.250	-23.741	0.000	-12.667	0.0	0.2	-0.002
0.50L	1.500	-8.741	0.000	-0.487	0.0	0.2	0.007
0.25L	0.750	6.259	0.000	0.444	0.0	0.1	0.005
Jt. 3	0.000	21.259	0.000	-9.876	0.0	0.0	0.011

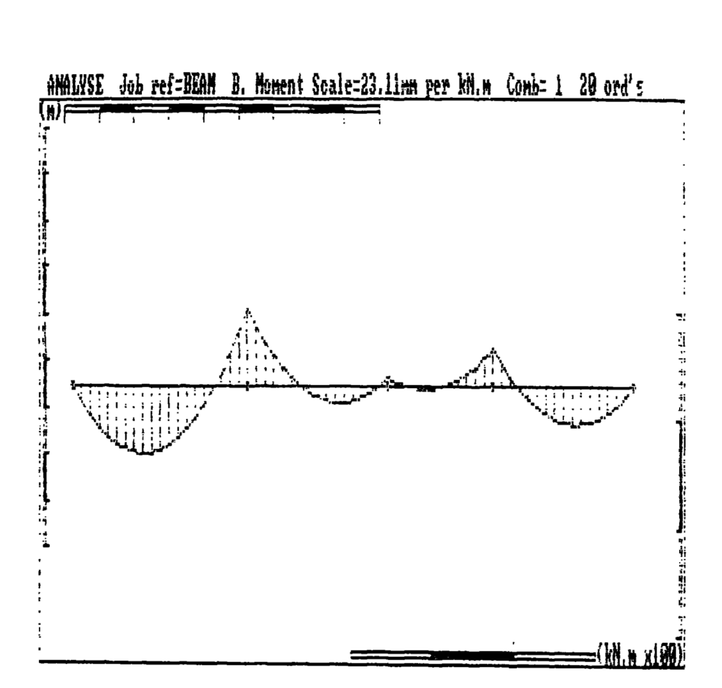
Maximum +ve Bending Moment 1.423 kN.m at 1.063m from joint 3
Maximum -ve Bending Moment -36.098 kN.m at 3.000m from joint 3

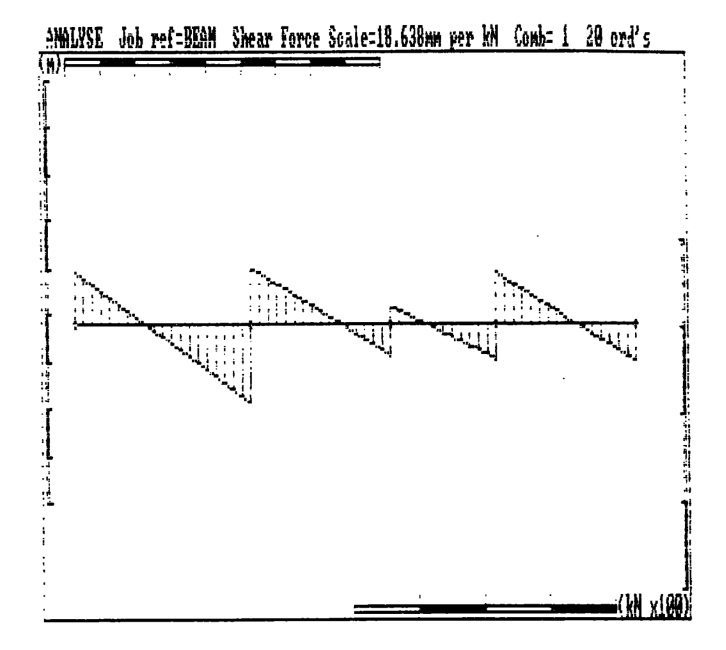
RESULTS FOR COMBINATION 1 MEMBER 4

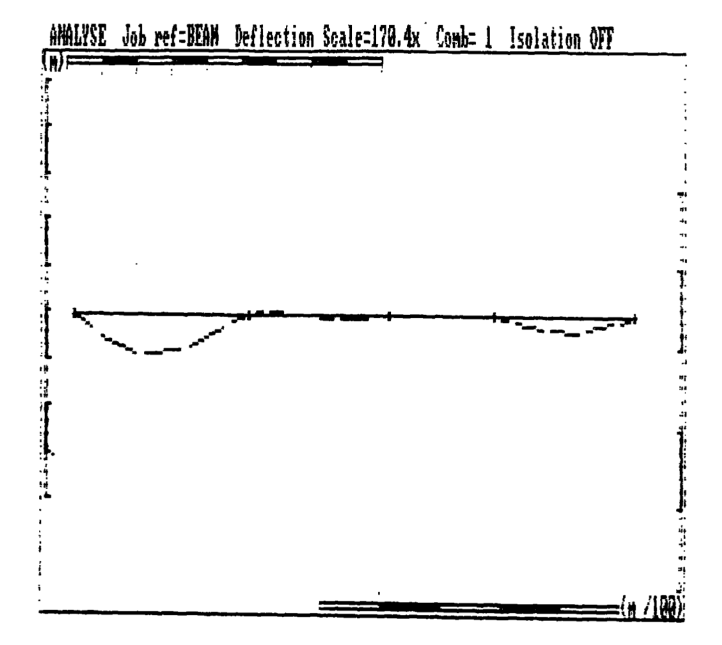
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	4.000	-40.975	0.000	0.000	0.0	0.0	0.087
0.75L	3.000	-15.975	0.000	28.475	0.0	-1.3	0.054
0.50L	2.000	9.025	0.000	31.951	0.0	-1.7	-0.012
0.25L	1.000	34.025	0.000	10.426	0.0	-1.0	-0.060
Jt. 4	0.000	59.025	0.000	-36.098	0.0	0.0	-0.038

Maximum +ve Bending Moment 33.580 kN.m at 2.361m from joint 4
Maximum -ve Bending Moment -36.098 kN.m at 0.000m from joint 4


ANALYSE Job ref=BEAM Geometry
(m)


ANALYSE Job ref=BEAM B. Moment Scale=23.11mm per kN.m Comb= 1 20 ord's
(m)
(kN.m x100)


ANALYSE Job ref=BEAM Shear Force Scale=18.638mm per kN Comb= 1 20 ord's
(m)
(kN x100)


ANALYSE Job ref=BEAM Deflection Scale=170.4x Comb= 1 Isolation OFF
(m)
(m /100)

بعد الانتهاء من حل الكمرة المستمرة وعليها حمل ميت فقط سنعيدالحل باضافة حمل حى وتعديل ابعاد الكمرة والاحمال المؤثرة عليها وذلك باستخدام شاشة (Disk utilities)

ـ نضغط [٣] فتظهرالشاشة التالية :

0 Exit from Utilities 1 Format a New data disk 2 Rename a previous job 3 Duplicate a previous job 4 Delete Selected jobs 5 Transfer Selected Jobs from the Fixed disk to a Floppy Data Disk 6 Copy Selected Jobs from a Floppy Data Disk to the Fixed Disk

نضغط [٣] مرة أخري لننشئ نسخة أخري من الكمرة المستمرة

(3 Duplicate a previous job)

وندخل رقم الكمرة المستمرة (Beam) فى قائمة المنشأت الموجودة بالشاشة وهو (١) مثلا .

نكتب ١ ثم نضغط [Enter] للادخال .

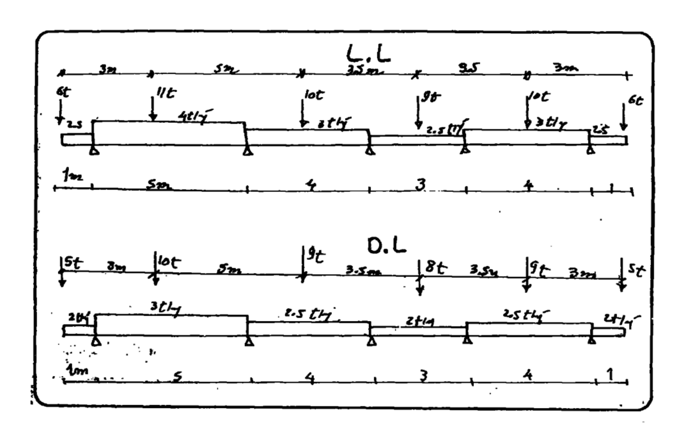
يظهر المؤشر فى اسفل الشاشة جهة اليمين لادخال الاسم الجديد للنسخة الأخرى من الكمرة المستمرة وليكن (Beam 1) ثم نضغط [Enter] للادخال وسنجرى بعض التعديلات على الكمرة المستمرة وهي :

١ـ اضافة كابولي من الجهتين .

٢ـ تغير الاحمال الميته (Dead load) كما بالرسم .

٣ـ اضافة احمال حية (Live load) كما بالرسم .

٤ـ تعديل قطاع الكمرة وليكن T-sec .



نضغط [٢] لاستدعاء منشأ تم ادخال بياناته وسنجرى بعض التعديلات عليه فتظهر الشاشة التالية :

List of Jobs on disk   29.5Kb Disk space free

Job 1 - BEAM
Job 2 - BEAM1

Continue Previous Job
Which Job No. 2 <

نجيب على السؤال الموجود اسفل الشاشة برقم المنشأ المطلوب تعديله وهو (Beam1) ورقمه [٢] . فتظهر الشاشة التالية :

```
Current job reference = BEAM1

0  Exit from this job
1  Revise job data
2  Analysis / Results
D  Draw the structure, Deflections, moments & forces
```

ـ نضغط [١] لاستدعاء بيانات المنشأ والتعديل فيها (1 Revise job data) فتظهر الشاشة التالية :

```
Current job reference = BEAMI
0  End this job
1  Joint positions
2  Member locations & fixity
3  Properties
4  Supports
5  Load case names
6  Member loads
7  Joint loads
8  Combinations
9  Analysis / Results
D  Draw the structure
```

ولاضافة الكابولي من الجهتين نضيف النقطتين ٦ ، ٧ لنقاط المنشأ واحداثياتهما كالاتي:

Jt	x	y
6	-1	0
7	17	0

- نضغط [١] نقاط المنشا (1 Joint positions)

- نضغط [F10] للوصول إلى النقطة رقم (٦) وندخل احداثياتها ونكرر ذلك مع النقطة [v] فتصبح الشاشة بالصورة التالية :

```
Joint positions
Jt   X coord   Y coord
No.  (m)       (m)
1    0.000     0.000
2    5.000     0.000
3    9.000     0.000
4    12.000    0.000
5    16.000    0.000
6    -1.000    0.000
7    17.000    0.000
8    0.000
```

نضغط [ESC] للتسجيل ونضغط [٢] لاضافة الاعضاء [٥] ، [٦] كالاتى:

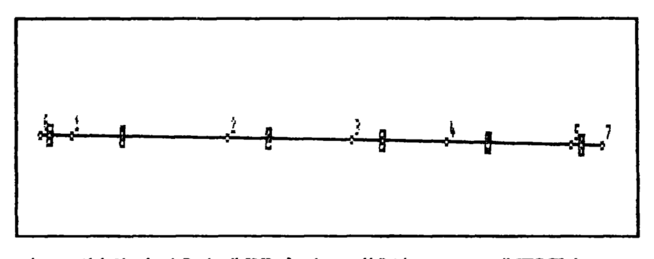
Member	E1	Jt. con	E2	Jt.con
5	6	F	1	F
6	5	F	7	F

نضغط [F10] للوصول إلى العضو رقم [٥] ندخل البيانات كما بالجدول ونكرر ذلك للعضو رقم [٦] فتصبح الشاشة بالصورة التالية :

Member location and fixity										
Mem	J1. Jnt		X1Coord	Y1Coord	J2 . Jnt		X2Coord	Y2Coord	Length	Slope
No	no.	con	(m)	(m)	no.	con	(m)	(m)	(m)	(deg)
1	1	F	0.000	0.000	2	F	5.000	0.000	5.000	0.000
2	2	F	5.000	0.000	3	F	9.000	0.000	4.000	0.000
3	3	F	9.000	0.000	4	F	12.000	0.000	3.000	0.000
4	4	F	12.000	0.000	5	F	16.000	0.000	4.000	0.000
5	6	F	-1.000	0.000	1	F	0.000	0.000	1.000	0.000
6	5	F	16.000	0.000	7	F	17.000	0.000	1.000	0.000
7	0									

نضغط [ESC] للتسجيل والتأكد من صحة احداثيات النقط المضافة [٦] ، [٧]

نضغط [D] لرسم المنشأ (D Draw the structure) ثم [F4] (Number) للتأكد من صحة ترقيم نقاط واعضاء الكمرة بعد التعديل ثم [F5] (Both) فتظهر الشاشة التالية :



نضغط [ESC] للخروج من شاشة الرسومات ثم [Y] للموافقةعلى انهائها للاستمرار فى ادخال البيانات نضغط [١] ثم [٢] لتعديل قطاع الكمرة إلى T-Sec بدلا من مستطيل ابعاده ٢٥ سم × ٤٠ سم .

نضغط [F9] (Command) ثم [F6] (Sections) فيتحرك المؤشر لاعلى بالضغط على [F6] (Top) نضغط [F9] (Command) ثم [F5] (Elements) لادخال بيانات عناصر القطاع (Section) كما بالجدول :

Element No	Y	B	D
1	100	1000	200
2	-250	250	500

نضغط [Enter] للإدخال ثم [Esc] لتسجيل عناصر القطاع (١) فتظهرالشاشة التالية:

```
Table of Sections     Member Section Properties
Section  Area      Inertia     No.of     Mem   Member          No.  Sec. Modulus  E
No       (cm2)     (cm4)       Elements  No.   Length   N/P   Seg   No.  (N.mm2)
1        1000.000  133333.33   0         1     5.000    P     1     1    21000.000
2        0.000                           2     4.000    P     1     1    21000.000
                                         3     3.000    P     1     1    21000.00
                                         4     4.000    P     1     1    21000.000
                                         5     1.000    P

Elements of Section no . 1
Elem  Y-dim     B-dim     D-dim
No.   (mm)      (mm)      (mm)  No Section properties for Member 5
1     100.000   1000.000  200.000
2     -250.000  250.000   500.000
3     0.000<
```

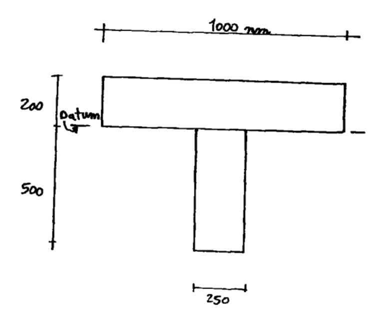
ثم الشاشة التالية :

Table of Section

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements	Mem No.	Member Length	N/p	No. Seg	Sec. No.	Modulus E (N/mm2)
1	3250.000	1269391.03	2	1	5.000	P	1	1	21000.000
2	0.000			2	4.000	P	1	1	21000.000
				3	3.000	P	1	1	21000.000
				4	4.000	P	1	1	21000.000
				5	1.000	P	1	1	21000.000
				6	1.000	P	1	1	21000.000

ويلاحظ ان المساحة اصبحت ٣٢٥٠ سم٢ وعزم القصورالذاتى ١٢٦٩٣٩١ سم٤ والقطاع مكون من عنصرين (No of Elements = 2) .

*** نضغط [F9] ثم [F6] للإنتقال إلى خصائص قطاع الكمرة في الجزء الاعلى من الشاشة جهة اليمين .**



* نضغط [F6] لتحريك المؤشر إلى قمة البيانات .

* نضغط [Enter] عدة مرات لان الاعضاء لها نفس رقم القطاع وهو (١) في جدول القطاعات (Table of sections) .

* نضيف قطاع العضوين رقم ٥ ، ٦وهو قطاع رقم (١) ايضا .

* نضغط [ESC] للتسجيل فتظهر الشاشة الرئيسية كما سبق .

* ويلاحظ لايوجد أى تعديل فى الركائز Supports .

* نضغط [٥] اسماء الاحمال (Load case names) لاضافة الحمل الحى (Live load) المؤثر على كل عضو علي حدة فمثلا العضو الأول عليه (Live Ld1) والثانى (Live Ld2) .... والسادس (Live ld6) .

Global load case names	
No.	Load Case Name
1	Dead Load
2	Live Load 1
3	Live Load 2
4	Live Load 3
5	Live Load 4
6	Live Load 5
7	Live Load 6
8	

* نضغط [ESC] للتسجيل والعودة للشاشة الرئيسية ،

* نضغط [٦] الاحمال المؤثرة علي اعضاء المنشأ (6 Member Loads) فتظهر الشاشة التالية :

MEMBER LOADS	
Mem No.	of
No.	Loads
1	1
2	1
3	1
4	1
5	0
6	0

* نضغط [F9] (Input) الموجودة فى أسفل الشاشة ونعدل بيانات العضو رقم (١) كالاتى :

* نضغط [F8] (Down) ونضيف الأحمال التالية :

Ld. No	Load case number & name	Ld type	Stant pos	loaded len	Start val	End val
2	1 Dead load	PV	2		100	
3	2 Live load 1	UV			40	
4	2 Live load 1	PV	2		110	

* ويلاحظ ان البعد ٢ متر من النهايةالاولى (E1) للعضو الاول .

* نضغط [ESC] للتسجيل ثم (N) لعدم نقل تلك الاحمال لاى عضو آخر . فتظهر الشاشة التالية :

MEMBER LOADS	Loads & moments on Member 1 (length=5.000m slope = 0.000deg)							
Mem No.	No.of Loads	Ld No.	Load case Number & name		Load Type	Start Pos(m)	Loaded Len(m)	(KN, KN.m or KN/m) Start val.	End val.
1	1	1	1	Dead Load	UV			30.000	
2	1	2	1	Dead Load	PV	2.000		100.000	
3	1	3	2	Live Load1	UV			40.000	
4	1	4	2	Live Load1	PV	2.000		110.000	
5	0	5	2						
6	0								

Transfer loads to other Mmebers ? Y/N

* نضغط [F9] (input) وندخل بيانات العضو الثانى وهى :

MEMBER LOADS	Loads & moments on Member 2 (length=4.000m slope = 0.000deg)								
Mem No.	No.of Loads	Ld No.	Load case Number & name		Load Type	Start Pos(m)	Loaded Len(m)	(KN, KN.m or KN/m) Start val.	End val.
1	4	1	1	Dead Load	UV			25.000	
2	1	2	1	Dead Load	PV	2.000		90.000	
3	1	3	3	Live Load 2	UV			30.000	
4	1	4	3	live Load 2	PV	2.000		100.000	
5	0	5	3<						
6	0								

* نضغط [ESC] للتسجيل ثم [N] لعدم نقل تلك الاحمال لاى عضو آخر .

* نضغط [F9] (Input) وندخل بيانات العضو الثالث وهى :

MEMBER LOADS Loads & moments on Member 3 (length=3.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld No.	Load case Number & name		Load Type	Start Pos(m)	Loaded Len(m)	(KN, KN.m or KN/m) Start val.	End val.
1	4	1	1	Dead Load	UV			20.000	
2	4	2	1	Dead Load	PV	1.500		80.000	
3	1	3	4	Live Load3	UV			25.000	
4	1	4	4	Live Load3	PV	1.500		90.000	
5	0	5	4						
6	0								

* نضغط (ESc] ثم (N) لزوم نقل تلك الأحمال لأى عضو آخر

* نضغط [F9] (Input) وندخل بيانات العضو الرابع وهى :

MEMBER LOADS Loads & moments on Member 4 (length=4.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld No.	Load case Number & name		Load Type	Start Pos(m)	Loaded Len(m)	(KN, KN.m or KN/m) Start val.	End val.
1	4	1	1	Dead Load	UV			25.000	
2	4	2	1	Dead Load	PV	2.000		90.000	
3	4	3	5	Live Load4	UV			30.000	
4	1	4	5	Live Load4	PV	2.000		100.000	
5	0	5	4						
6	0								

* نضغط [ESC] للتسجيل ثم [N] لعدم نقل تلك الاحمال لاى عضو آخر .

* نضغط [F9] (input) وندخل بيانات العضو الخامس وهى:

MEMBER LOADS Loads & moments on Member 5 (length=1.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld No.	Load case Number & name		Load Type	Start Pos(m)	Loaded Len(m)	(KN, KN.m or KN/m) Start val.	End val.
1	4	1	1	Dead Load	UV			20.000	
2	4	2	1	Dead Load	PV	0.000		50.000	
3	4	3	6	Live Load5	UV			25.000	
4	4	4	6	Live Load5	PV	0.000		60.000	
5	0	5	2						
6	0								

- نضغط [ESC] للتسجيل ثم [N] لعدم نقل تلك الأحمال لاى عضو أخر

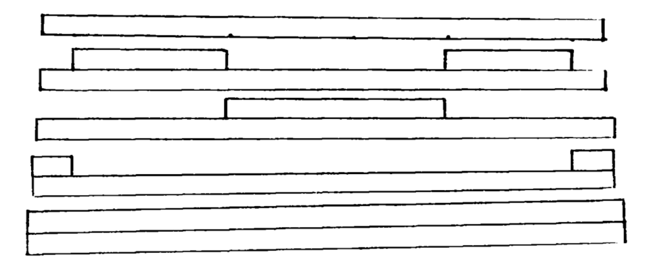
- نضغط [F9] (Input) وندخل بيانات العضو السادس والأخير وهى :

MEMBER LOADS Loads & moments on Member 6 (length = 1.000m slope = 0.000deg)

Mem No.	no. of loads	ld. No.	load case Number & name		load Type	start Pos (m)	loaded Len (m)	(KN, KN.m or KN/m) Start Val.	End val.
1	4	1	1	Dead Load	UV				20.000
2	4	2	1	Dead Load	PV	1.000			50.000
3	4	3	7	Live Load6	UV				25.000
4	4	4	7	Live Load6	PV	1.000			60.000
5	4	5	7						
6	0								

- نضغط [ESC] للتسجيل والخروج للشاشة الرئيسية .

وبعد ذلك يمكن تعريف حالات التحميل للكمرة (DL + LL) ونفترض أن عددها خمسة كما بالرسم .



– نضغط [٨] حالات التحميل (8 Combinaions) فتظهر الشاشة التالية :

```
Safety Factors for combination
Load Case              Safety
Number and name        Factor



Start a new set of Combinations Y/N (Y Erases all previous combinations)
```

– نضـغط [Y] لتسجيل حالات التحميل الجديدة والغاء الحالات السابقة فيظهر المؤشر اسفل الشاشة وندخل عدد حالات التحميل = خمسة فتظهر الشاشة التالية :

```
Safety Factors   for   Combination   1
Load Case                    Safety
Number and name              Factor
1            Dead Load        1.000
2         Live Load 1         0.000
3         Live Load 2         0.000
4         Live Load 3         0.000
5         Live Load 4         0.000
6         Live Load 5         0.000
7         Live Load 6         0.000<
```

يوجد العنوان بالسطر الأول وهو عامل الأمان لحالة التحميل الأولى
(Safety Factors For Combination 1)

والسطر الثانى به رقم الحمل واسمه (Load case number and name) وعامل الأمان . (Safety factor)

وحالة التحميل الأولى (Comb1) من الرسم السابق هى (Dead Load) فقط ندخل عامل الأمان = ١ أى ١٠٠ ٪ من قيمة الحمل السابق والمؤثر على كل الأعضاء ولعدم وجود أحمال حيه نترك باقى القيم = صفر .

نضغط [F9] ثم [F6] لادخال بيانات حالة التحميل الثانية (Comb 2) وهى
(DL X 1 + LL1 X 1 + LL4 X 1)

– يظهر المؤشر فى أعلى الشاشة وندخل القيمة = ١ ثم (Enter) للادخال وندخل نفس القيمة للحمل الحى الأول (LL1) .

– نضغط [F8] مرتين للوصول إلى السطر الخامس وندخل القيمة = ١ ثم (Enter) للادخال لحالة الحمل الحى الرابع (LL4) .

تظهر الشاشة فى الصورة التالية :

Safety Factors for Combination 2

Load Case Number and name		Safety Factor
1	Dead Load	1.000
2	Live Load 1	1.000
3	Live Load 2	0.000
4	Live Load 3	0.000
5	Live Load 4	1.000
6	Live Load 5	0.000
7	Live Load 6	0.000<

– نضغط [F9] ثم [F6] لادخال بيانات حالة التحميل الثالثة (Comb 3) وهى :
(DL X 1 + LL2 X 1 + LL3 X 1)

تظهر الشاشة فى الصورة التالية :

Safety Factors for Combination 3		
Load Case		Safety
Number and name		Factor
1	Dead Load	1.000
2	Live Load 1	0.000
3	Live Load 2	1.000
4	Live Load 3	1.000
5	Live Load 4	0.000
6	Live Load 5	0.000
7	Live Load 6	0.000<

– نكرر ما سبق مع حالة التحميل الرابعة (Comb 4) وهى :

(DL X 1 + LL5 X 1 + LL6 X 1)

فتظهر الشاشة فى الصورة التالية

Safety Factors for Combination 4		
Load Case		Safety
Number and name		Factor
1	Dead Load	1.000<
2	Live Load 1	0.000
3	Live Load 2	0.000
4	Live Load 3	0.000
5	Live Load 4	0.000
6	Live Load 5	1.000
7	Live Load 6	1.000

وأخيرا مع حالة التحميل الخامسة (Comb 5) وهى :

(DL X 1 + LL1 X 1 + LL2 X 1+ LL3 X 1+ LL4 X 1+LL5 X 1+LL6 X 1)

فتظهر الشاشة فى الصورة التالية :

Safety Factors for Combination 5

Load Case Number and name		Safety Factor
1	Dead Load	1.000
2	Live Load 1	1.000
3	Live Load 2	1.000
4	Live Load 3	1.000
5	Live Load 4	1.000
6	Live Load 5	1.000
7	Live Load 6	1.000

- نضغط [Esc] لتسجيل حالات التحميل كلها فتظهر الشاشة الرئيسية .

- نضغط [٩] ثم [٢] للبدء فى الحل .

- تظهر بيانات ونتائج المنشأ كالاتى .

Joint positions

Jt. No.	X coord (m)	Y coord (m)
1	0.000	0.000
2	5.000	0.000
3	9.000	0.000
4	12.000	0.000
5	16.000	0.000
6	-1.000	0.000
7	17.000	0.000
8		

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Member location and fixity

Mem No.	J1. no.	Jnt con	X1 Coord (m)	Y1 Coord (m)	J2. no.	Jnt con	X2 Coord (m)	Y2 Coord (m)	Length (m)	Slope (deg)
1	1<	F	0.000	0.000	2	F	5.000	0.000	5.000	0.000
2	2	F	5.000	0.000	3	F	9.000	0.000	4.000	0.000
3	3	F	9.000	0.000	4	F	12.000	0.000	3.000	0.000
4	4	F	12.000	0.000	5	F	16.000	0.000	4.000	0.000
5	6	F	-1.000	0.000	1	F	0.000	0.000	1.000	0.000
6	5	F	16.000	0.000	7	F	17.000	0.000	1.000	0.000
7										

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section	Area	Inertia	No. of

No.	(cm2)	(cm4)	Elements
1	3250.000	1269391.03	2
2			

Elements of Section no. 1

Elem No.	Y-dim (mm)	B-dim (mm)	D-dim (mm)
1	100.000	1000.000	200.000
2	-250.000	250.000	500.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	3250.000	1269391.03	2
2	0.000		

Member Section Properties

Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
2	4.000	P	1	1	21000.000
3	3.000	P	1	1	21000.000
4	4.000	P	1	1	21000.000
5	1.000	P	1	1	21000.000
6	1.000	P<	1	1	21000.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Supports

No.	Jnt Pos	X Restraint (kN/mm)	Y Restraint (kN/mm)	A Restraint (kNm/rad)
1	1	FULL	FULL	ZERO
2	2	ZERO	FULL	ZERO
3	3	ZERO	FULL	ZERO
4	4	ZERO	FULL	ZERO
5	5	ZERO	FULL	ZERO
6				

```
Input mode


  F1      F2                 F6       F7       F8       F9       F10      ESC                NUMLOCK
 Help    Calc               Top      Up       Down    Commnd  Bottom   Escape                is ON

Global load case names

No.   Load Case Name
  1        Dead Load
  2      live lcad 1
  3      live load 2
  4      live load 3
  5      live load 4
  6      live load 5
  7      live load 6
  8
```

```
Input mode


  F1      F2                 F6       F7       F8       F9       F10      ESC                NUMLOCK
 Help    Calc               Top      Up       Down    Commnd  Bottom   Escape                is ON

Safety Factors for Combination  1
Load Case                 Safety
Number and name           factor
  1        Dead Load        1.000<
  2      live load 1        0.000
  3      live load 2        0.000
  4      live load 3        0.000
  5      live load 4        0.000
  6      live load 5        0.000
  7      live load 6        0.000
```

```
Input mode



  F1     F2                 F6     F7      F8      F9      F10     ESC            NUMLOCK
 Help   Calc               Top     Up     Down   Commnd  Bottom  Escape            is ON

Safety Factors for Combination  2
Load Case                  Safety
Number and name            factor
  1        Dead Load        1.000
  2      live load 1        1.000
  3      live load 2        0.000
  4      live load 3        0.000
  5      live load 4        1.000
  6      live load 5        0.000
  7      live load 6        0.000
```

```
Input mode



  F1     F2                 F6     F7      F8      F9      F10     ESC            NUMLOCK
 Help   Calc               Top     Up     Down   Commnd  Bottom  Escape            is ON

Safety Factors for Combination  3
Load Case                  Safety
Number and name            factor
  1        Dead Load        1.000
  2      live load 1        0.000
  3      live load 2        1.000
  4      live load 3        1.000
  5      live load 4        0.000
  6      live load 5        0.000
  7      live load 6        0.000
```

```
Input mode



  F1     F2                 F6     F7      F8      F9      F10     ESC            NUMLOCK
 Help   Calc               Top     Up     Down   Commnd  Bottom  Escape            is ON
```

Safety Factors for Combination 4

Load Case Number and name		Safety factor
1	Dead Load	1.000
2	live load 1	0.000
3	live load 2	0.000
4	live load 3	0.000
5	live load 4	0.000
6	live load 5	1.000
7	live load 6	1.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Safety Factors for Combination 5

Load Case Number and name		Safety factor
1	Dead Load	1.000
2	live load 1	1.000
3	live load 2	1.000
4	live load 3	1.000
5	live load 4	1.000
6	live load 5	1.000
7	live load 6	1.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

MEMBER LOADS   Loads & moments on Member 1 (length = 5.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld. No.	Load case Number & name		Load Type	Start Pos(m)	Loaded Len(m)	(kN, kN.m or kN/m) Start val.	End val.
1	4	1	1	Dead Load	UV			30.000	
2	4	2	1	Dead Load	PV	2.000		100.000	
3	4	3	2	live load 1	UV			40.000	
4	4	4	2	live load 1	PV	2.000		110.000	
5	4	5							

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

MEMBER LOADS   Loads & moments on Member 2 (length = 4.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld. No.	Load case Number & name	Load Type	Start Pos(m)	Loaded Len(m)	(kN, kN.m or kN/m) Start val.	End val.
1	4	1	1 Dead Load	UV			25.000	
2	4	2	1 Dead Load	PV	2.000		90.000	
3	4	3	3 live load 2	UV			30.000	
4	4	4	3 live load 2	PV	2.000		100.000	
5	4	5						
6	4							

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

MEMBER LOADS   Loads & moments on Member 3 (length = 3.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld. No.	Load case Number & name	Load Type	Start Pos(m)	Loaded Len(m)	(kN, kN.m or kN/m) Start val.	End val.
1	4	1	1 Dead Load	UV			20.000	
2	4	2	1 Dead Load	PV	1.500		80.000	
3	4	3	4 live load 3	UV			25.000	
4	4	4	4 live load 3	PV	1.500		90.000	
5	4	5						
6	4							

```
                    Input mode


   F1      F2              F6      F7      F8      F9      F10     ESC          NUMLOCK
  Help    Calc            Top      Up     Down  Commnd  Bottom  Escape           is ON

MEMBER LOADS  Loads & moments on Member 4  (length = 4.000m slope = 0.000deg)
Mem   No.of   Ld.  Load case          Load  Start  Loaded  ( kN, kN.m or kN/m )
No.   Loads   No.  Number & name      Type  Pos(m) Len(m)  Start val.    End val.
  1     4       1   1<     Dead Load  UV                       25.000
  2     4       2   1      Dead Load  PV    2.000              90.000
  3     4       3   5    live load 4  UV                       30.000
  4     4       4   5    live load 4  PV    2.000             100.000
  5     4       5
  6     4
```

```
                    Input mode


   F1      F2              F6      F7      F8      F9      F10     ESC          NUMLOCK
  Help    Calc            Top      Up     Down  Commnd  Bottom  Escape           is ON

MEMBER LOADS  Loads & moments on Member 5  (length = 1.000m slope = 0.000deg)
Mem   No.of   Ld.  Load case          Load  Start  Loaded  ( kN, kN.m or kN/m )
No.   Loads   No.  Number & name      Type  Pos(m) Len(m)  Start val.    End val.
  1     4       1   1      Dead Load  UV                       20.000
  2     4       2   1      Dead Load  PV    0.000              50.000
  3     4       3   6    live load 5  UV                       25.000
  4     4       4   6    live load 5  PV    0.000              60.000
  5     4       5
  6     4
```

```
                    Input mode


   F1      F2              F6      F7      F8      F9      F10     ESC          NUMLOCK
```

```
 Help   Calc           Top     Up    Down  Commnd Bottom Escape          is ON

MEMBER LOADS    Loads & moments on Member 6  (length = 1.000m slope = 0.000deg)
Mem   No.of     Ld.  Load case           Load  Start Loaded  ( kN, kN.m or kN/m )
No.   Loads     No.  Number & name       Type Pos(m) Len(m) Start val.   End val.
 1      4        1   1<        Dead Load UV                    20.000
 2      4        2   1         Dead Load PV   1.000            50.000
 3      4        3   7      live load 6 UV                     25.000
 4      4        4   7      live load 6 PV    1.000            60.000
 5      4        5
 6      4
```

```
               Input mode
```

```
  F1    F2              F6     F7     F8     F9     F10    ESC          NUMLOCK
 Help   Calc            Top    Up    Down  Commnd Bottom Escape          is ON
===============================================================================
*                          *                               * JOB : BEAM1
*--------------------------*-------------------------------*-----------------
*                          *                               * DATE:
*                          *                               *-----------------
*                          *      I N P U T   D A T A      *SHEET:      1
*-----------------------------------------------------------------------------
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===============================================================================
FRAME GEOMETRY

No. of Joints = 7

MEMBERS
---:------ End 1 Details ------:------ End 2 Details ------:---------:---------
Mem:Jt.:C:  X coord :  Y coord :Jt.:C:  X Coord :  Y Coord :  Length :  Slope
No.:no.: :      (m) :      (m) :no.: :      (m) :      (m) :     (m) :  (deg)
---:---:-:----------:----------:---:-:----------:----------:---------:---------
 1:  1:F:    0.000 :    0.000 :  2:F:    5.000 :    0.000 :   5.000 :   0.00
 2:  2:F:    5.000 :    0.000 :  3:F:    9.000 :    0.000 :   4.000 :   0.00
 3:  3:F:    9.000 :    0.000 :  4:F:   12.000 :    0.000 :   3.000 :   0.00
 4:  4:F:   12.000 :    0.000 :  5:F:   16.000 :    0.000 :   4.000 :   0.00
 5:  6:F:   -1.000 :    0.000 :  1:F:    0.000 :    0.000 :   1.000 :   0.00
 6:  5:F:   16.000 :    0.000 :  7:F:   17.000 :    0.000 :   1.000 :   0.00
===============================================================================
TABLE OF SECTIONS

Section :    Area:   Inertia: Rectangular Elements (if specified)
Number  :   (cm2):     (cm4): No:  D (mm):   B (mm):    Y (mm)
--------:--------:----------:---:--------:---------:-------------
   1    : 3250.00: 1269391.0:  1:  200.00:  1000.00:    100.00
        :        :          :  2:  500.00:   250.00:   -250.00
--------:--------:----------:---:--------:---------:-------------
```

```
================================================================================
SUMMARY OF MEMBER PROPERTIES

Member 1 - 6 PRISMATIC : Section Number  1 : Modulus E =    21000.0 N/mm2
================================================================================
SUPPORTS

No. of Supports =  5

  Joint : X Restraint : Y Restraint : Angular Restraint
 Number :   ( kN/mm ) :   ( kN/mm ) :   ( kN.m/radian )
--------:-------------:-------------:-------------------
    1   :     FULL    :     FULL    :       ZERO
    2   :     ZERO    :     FULL    :       ZERO
    3   :     ZERO    :     FULL    :       ZERO
    4   :     ZERO    :     FULL    :       ZERO
    5   :     ZERO    :     FULL    :       ZERO
================================================================================
APPLIED LOADS AND MOMENTS

MEMBER 1

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:    Length:   Start Value:      End Value
---:-----------------:----:----------:----------:---------------:---------------
  1:       Dead Load: UV :           :          :    30.000 kN/m:
  1:              ''  : PV :  2.000 m :          :   100.000 kN   :
  2:     live load 1: UV :           :          :    40.000 kN/m:
  2:              ''  : PV :  2.000 m :          :   110.000 kN   :
--------------------------------------------------------------------------------


================================================================================
*                              *                              * JOB : BEAM1
*------------------------------*------------------------------*-----------------
*                              *                              * DATE:
*                              *                              *-----------------
*                              *     I N P U T   D A T A      *SHEET:      2
*-------------------------------------------------------------------------------
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================================================================================
APPLIED LOADS AND MOMENTS continued

MEMBER 2

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:    Length:   Start Value:      End Value
---:-----------------:----:----------:----------:---------------:---------------
  1:       Dead Load: UV :           :          :    25.000 kN/m:
  1:              ''  : PV :  2.000 m :          :    90.000 kN   :
  3:     live load 2: UV :           :          :    30.000 kN/m:
  3:              ''  : PV :  2.000 m :          :   100.000 kN   :
--------------------------------------------------------------------------------
MEMBER 3

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:    Length:   Start Value:      End Value
---:-----------------:----:----------:----------:---------------:---------------
  1:       Dead Load: UV :           :          :    20.000 kN/m:
```

```
  1:            ''  : PV :  1.500 m :            :   80.000 kN   :
  4:     live load 3: UV :            :            :   25.000 kN/m:
  4:            ''  : PV :  1.500 m :            :   90.000 kN   :
------------------------------------------------------------------------------
MEMBER 4

L O A D   C A S E   :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name           :Type:     Start:    Length:   Start Value:      End Value
---:----------------:----:----------:----------:---------------:---------------
  1:       Dead Load: UV :            :            :   25.000 kN/m:
  1:            ''  : PV :  2.000 m :            :   90.000 kN   :
  5:     live load 4: UV :            :            :   30.000 kN/m:
  5:            ''  : PV :  2.000 m :            :  100.000 kN   :
------------------------------------------------------------------------------
MEMBER 5

L O A D   C A S E   :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name           :Type:     Start:    Length:   Start Value:      End Value
---:----------------:----:----------:----------:---------------:---------------
  1:       Dead Load: UV :            :            :   20.000 kN/m:
  1:            ''  : PV :  0.000 m :            :   50.000 kN   :
  6:     live load 5: UV :            :            :   25.000 kN/m:
  6:            ''  : PV :  0.000 m :            :   60.000 kN   :
------------------------------------------------------------------------------
MEMBER 6

L O A D   C A S E   :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name           :Type:     Start:    Length:   Start Value:      End Value
---:----------------:----:----------:----------:---------------:---------------
  1:       Dead Load: UV :            :            :   20.000 kN/m:
  1:            ''  : PV :  1.000 m :            :   50.000 kN   :
  7:     live load 6: UV :            :            :   25.000 kN/m:
  7:            ''  : PV :  1.000 m :            :   60.000 kN   :
==============================================================================



==============================================================================
*                         *                              * JOB : BEAM1
*-------------------------*------------------------------*---------------
*                         *                              * DATE:
*                         *                              *---------------
*                         *      I N P U T   D A T A     *SHEET:      3
*-----------------------------------------------------------------------------
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==============================================================================
COMBINATIONS

                    : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E   : Combination Number
No : Name           :  1  :  2  :  3  :  4  :  5
--------------------:-----:-----:-----:-----:-----
  1:       Dead Load:1.000:1.000:1.000:1.000:1.000
  2:     live load 1:     :1.000:     :     :1.000
  3:     live load 2:     :     :1.000:     :1.000
  4:     live load 3:     :     :1.000:     :1.000
  5:     live load 4:     :1.000:     :     :1.000
  6:     live load 5:     :     :     :1.000:1.000

  7:     live load 6:     :     :     :1.000:1.000
==============================================================================
```

* JOB : BEAM1

* DATE:

* A N A L Y S I S R E S U L T S *SHEET: 4

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RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0004	0.000	192.174	0.000
2	0.00	0.00	0.0001	0.000	242.409	0.000
3	0.00	0.00	0.0000	0.000	137.644	0.000
4	0.00	0.00	-0.0001	0.000	175.052	0.000
5	0.00	0.00	0.0001	0.000	162.721	0.000
6	0.00	0.35	-0.0003			
7	0.00	0.04	0.0000			

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-910.000	-7155.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-910.000	-7155.000
Summation	0.000	910.000	7155.000
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 2

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0014	0.000	331.472	0.000
2	0.00	0.00	0.0007	0.000	460.817	0.000
3	0.00	0.00	0.0000	0.000	41.027	0.000
4	0.00	0.00	-0.0003	0.000	356.318	0.000
5	0.00	0.00	0.0006	0.000	250.365	0.000
6	0.00	1.38	-0.0013			
7	0.00	0.49	0.0005			

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-1440.000	-10955.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-1440.000	-10955.000
Summation	0.000	1440.000	10955.000
Summation	0.000	0.000	0.000

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RESULTS FOR COMBINATION 3

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	O(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0003	0.000	184.492	0.000
2	0.00	0.00	-0.0001	0.000	345.408	0.000
3	0.00	0.00	0.0001	0.000	372.899	0.000
4	0.00	0.00	0.0000	0.000	232.714	0.000
5	0.00	0.00	0.0001	0.000	159.488	0.000
6	0.00	0.23	-0.0002			
7	0.00	0.01	0.0000			

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-1295.000	-10427.500
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-1295.000	-10427.500
Summation	0.000	1295.000	10427.500
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 4

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	O(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0000	0.000	296.211	0.000
2	0.00	0.00	0.0001	0.000	214.841	0.000
3	0.00	0.00	0.0000	0.000	157.713	0.000
4	0.00	0.00	0.0000	0.000	139.598	0.000
5	0.00	0.00	-0.0002	0.000	271.638	0.000
6	0.00	-0.12	0.0002			
7	0.00	-0.35	-0.0004			

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-1080.000	-8515.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-1080.000	-8515.000
Summation	0.000	1080.000	8515.000
Summation	0.000	0.000	0.000

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RESULTS FOR COMBINATION 5

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0009	0.000	427.826	0.000
2	0.00	0.00	0.0003	0.000	536.247	0.000
3	0.00	0.00	0.0001	0.000	296.351	0.000
4	0.00	0.00	-0.0002	0.000	378.526	0.000
5	0.00	0.00	0.0002	0.000	356.049	0.000
6	0.00	0.79	-0.0007			
7	0.00	0.07	0.0000			

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-1995.000	-15587.500
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-1995.000	-15587.500
Summation	0.000	1995.000	15587.500
Summation	0.000	0.000	0.000

Maxima for Member 1

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-127.826	0.000	0.000	124.349	2.000	-124.129	5.000
2	-298.528	0.000	0.000	322.943	2.000	-257.642	5.000
3	-135.508	0.000	0.000	108.984	2.000	-162.541	5.000
4	141.211	0.000	0.000	89.921	2.000	-132.500	0.000
5	-287.174	0.000	0.000	273.151	2.000	-273.371	5.000

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	114.583	0.000	0.000	55.038	2.000	-124.129	0.000
2	162.289	0.000	0.000	26.871	2.892	-257.642	0.000
3	209.900	0.000	0.000	147.259	2.000	-162.541	0.000
4	106.051	0.000	0.000	60.656	2.000	-101.447	0.000
5	249.073	0.000	0.000	114.775	2.000	-273.371	0.000

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-77.773	0.000	0.000	25.045	1.500	-69.115	3.000
2	-126.684	0.000	0.000	15.946	0.666	-158.539	3.000
3	172.798	0.000	0.000	65.630	1.500	-142.942	0.000
4	73.764	0.000	0.000	30.905	1.500	-57.241	0.000
5	-169.575	0.000	0.000	55.433	1.500	-148.305	3.000

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Maxima for Member 4

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	97.279	0.000	0.000	75.442	2.000	-69.115	0.000
2	229.635	0.000	0.000	190.731	2.000	-158.539	0.000
3	100.512	0.000	0.000	68.976	2.000	-82.048	0.000
4	-116.638	0.000	0.000	50.776	2.000	-132.500	4.000
5	208.951	0.000	0.000	159.598	2.000	-148.305	0.000

Maxima for Member 5

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-70.000	0.000	0.000	0.000	0.000	-60.000	1.000
2	-70.000	0.000	0.000	0.000	0.000	-60.000	1.000
3	-70.000	0.000	0.000	0.000	0.000	-60.000	1.000
4	-155.000	0.000	0.000	0.000	0.000	-132.500	1.000
5	-155.000	0.000	0.000	0.000	0.000	-132.500	1.000

Maxima for Member 6

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	70.000	0.000	0.000	0.000	1.000	-60.000	0.000
2	70.000	0.000	0.000	0.000	0.000	-60.000	0.000
3	70.000	0.000	0.000	0.000	1.000	-60.000	0.000
4	155.000	0.000	0.000	0.000	1.000	-132.500	0.000
5	155.000	0.000	0.000	0.000	0.000	-132.500	0.000

RESULTS FOR COMBINATION 1 MEMBER 1

Position	(m) from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	5.000	-127.826	0.000	-124.129	0.0	0.0	0.008
0.75L	3.750	-90.326	0.000	12.216	0.0	-0.4	0.022
0.50L	2.500	-52.826	0.000	101.686	0.0	-0.8	0.006
0.25L	1.250	84.674	0.000	69.280	0.0	-0.6	-0.022
Jt. 1	0.000	122.174	0.000	-60.000	0.0	0.0	-0.024

Maximum +ve Bending Moment 124.349 kN.m at 2.000m from joint 1
Maximum -ve Bending Moment -124.129 kN.m at 5.000m from joint 1

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RESULTS FOR COMBINATION 1 MEMBER 2

	Position (m) from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.000	-75.417	0.000	-45.796	0.0	0.0	0.003
0.75L	3.000	-50.417	0.000	17.121	0.0	-0.1	0.005
0.50L	2.000	64.583	0.000	55.038	0.0	-0.1	-0.003
0.25L	1.000	89.583	0.000	-22.045	0.0	0.0	-0.007
Jt. 2	0.000	114.583	0.000	-124.129	0.0	0.0	0.008

Maximum +ve Bending Moment 55.038 kN.m at 2.000m from joint 2
Maximum -ve Bending Moment -124.129 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 3

	Position (m) from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	-77.773	0.000	-69.115	0.0	0.0	-0.005
0.75L	2.250	-62.773	0.000	-16.410	0.0	0.0	0.001
0.50L	1.500	-47.773	0.000	25.045	0.0	0.0	0.001
0.25L	0.750	47.227	0.000	-4.751	0.0	0.0	-0.001
Jt. 3	0.000	62.227	0.000	-45.796	0.0	0.0	0.003

Maximum +ve Bending Moment 25.045 kN.m at 1.500m from joint 3
Maximum -ve Bending Moment -69.115 kN.m at 3.000m from joint 3

RESULTS FOR COMBINATION 1 MEMBER 4

	Position (m) from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	4.000	-92.721	0.000	-60.000	0.0	0.0	0.007
0.75L	3.000	-67.721	0.000	20.221	0.0	-0.2	0.010
0.50L	2.000	47.279	0.000	75.442	0.0	-0.3	0.000
0.25L	1.000	72.279	0.000	15.664	0.0	-0.2	-0.011
Jt. 4	0.000	97.279	0.000	-69.115	0.0	0.0	-0.005

Maximum +ve Bending Moment 75.442 kN.m at 2.000m from joint 4
Maximum -ve Bending Moment -69.115 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 1 MEMBER 5

Position (m) Shear Force Axial Comp. Bend.Moment dx dy Slope

	from End 1	(kN)	(kN)	(kN.m)	(mm)	(mm)	(deg)
Jt. 1	1.000	-70.000	0.000	-60.000	0.0	0.0	-0.024
0.75L	0.750	-65.000	0.000	-43.125	0.0	0.1	-0.021
0.50L	0.500	-60.000	0.000	-27.500	0.0	0.2	-0.020
0.25L	0.250	-55.000	0.000	-13.125	0.0	0.3	-0.019
Jt. 6	0.000	-50.000	0.000	0.000	0.0	0.4	-0.018

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 6
Maximum -ve Bending Moment -60.000 kN.m at 1.000m from joint 6

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RESULTS FOR COMBINATION 1 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	1.000	50.000	0.000	0.000	0.0	0.0	0.000
0.75L	0.750	55.000	0.000	-13.125	0.0	0.0	0.001
0.50L	0.500	60.000	0.000	-27.500	0.0	0.0	0.002
0.25L	0.250	65.000	0.000	-43.125	0.0	0.0	0.004
Jt. 5	0.000	70.000	0.000	-60.000	0.0	0.0	0.007

Maximum +ve Bending Moment 0.000 kN.m at 1.000m from joint 5
Maximum -ve Bending Moment -60.000 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 2 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	5.000	-298.528	0.000	-257.642	0.0	0.0	0.039
0.75L	3.750	-211.028	0.000	60.831	0.0	-1.3	0.063
0.50L	2.500	-123.528	0.000	269.929	0.0	-2.2	0.016
0.25L	1.250	173.972	0.000	212.152	0.0	-1.7	-0.060
Jt. 1	0.000	261.472	0.000	-60.000	0.0	0.0	-0.083

Maximum +ve Bending Moment 322.943 kN.m at 2.000m from joint 1
Maximum -ve Bending Moment -257.642 kN.m at 5.000m from joint 1

RESULTS FOR COMBINATION 2 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.000	-27.711	0.000	11.513	0.0	0.0	0.000
0.75L	3.000	-2.711	0.000	26.724	0.0	0.0	-0.005
0.50L	2.000	112.289	0.000	16.936	0.0	0.2	-0.010
0.25L	1.000	137.289	0.000	-107.853	0.0	0.3	0.000
Jt. 2	0.000	162.289	0.000	-257.642	0.0	0.0	0.039

Maximum +ve Bending Moment 26.871 kN.m at 2.892m from joint 2
Maximum -ve Bending Moment -257.642 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 2 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	-126.684	0.000	-158.539	0.0	0.0	-0.018
0.75L	2.250	-111.684	0.000	-69.151	0.0	0.1	0.000
0.50L	1.500	-96.684	0.000	8.987	0.0	0.1	0.005
0.25L	0.750	-1.684	0.000	15.875	0.0	0.0	0.002
Jt. 3	0.000	13.316	0.000	11.513	0.0	0.0	0.000

Maximum +ve Bending Moment 15.946 kN.m at 0.666m from joint 3
Maximum -ve Bending Moment -158.539 kN.m at 3.000m from joint 3

RESULTS FOR COMBINATION 2 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	4.000	-180.365	0.000	-60.000	0.0	0.0	0.032
0.75L	3.000	-125.365	0.000	92.865	0.0	-0.6	0.028
0.50L	2.000	119.635	0.000	190.731	0.0	-0.8	-0.004
0.25L	1.000	174.635	0.000	43.596	0.0	-0.5	-0.030
Jt. 4	0.000	229.635	0.000	-158.539	0.0	0.0	-0.018

Maximum +ve Bending Moment 190.731 kN.m at 2.000m from joint 4
Maximum -ve Bending Moment -158.539 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 2 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 1	1.000	-70.000	0.000	-60.000	0.0	0.0	-0.083
0.75L	0.750	-65.000	0.000	-43.125	0.0	0.4	-0.080
0.50L	0.500	-60.000	0.000	-27.500	0.0	0.7	-0.078
0.25L	0.250	-55.000	0.000	-13.125	0.0	1.0	-0.077
Jt. 6	0.000	-50.000	0.000	0.000	0.0	1.4	-0.077

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 6
Maximum -ve Bending Moment -60.000 kN.m at 1.000m from joint 6

RESULTS FOR COMBINATION 2 MEMBER 6

Position (m) from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)

Jt. 7	1.000	50.000	0.000	0.000	0.0	0.5	0.026
0.75L	0.750	55.000	0.000	-13.125	0.0	0.4	0.027
0.50L	0.500	60.000	0.000	-27.500	0.0	0.3	0.028
0.25L	0.250	65.000	0.000	-43.125	0.0	0.1	0.030
Jt. 5	0.000	70.000	0.000	-60.000	0.0	0.0	0.032

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment -60.000 kN.m at 0.000m from joint 5

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RESULTS FOR COMBINATION 3 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	5.000	-135.508	0.000	-162.541	0.0	0.0	-0.005
0.75L	3.750	-98.008	0.000	-16.593	0.0	-0.2	0.018
0.50L	2.500	-60.508	0.000	82.480	0.0	-0.5	0.008
0.25L	1.250	76.992	0.000	59.677	0.0	-0.4	-0.016
Jt. 1	0.000	114.492	0.000	-60.000	0.0	0.0	-0.017

Maximum +ve Bending Moment 108.984 kN.m at 2.000m from joint 1
Maximum -ve Bending Moment -162.541 kN.m at 5.000m from joint 1

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RESULTS FOR COMBINATION 3 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.000	-200.100	0.000	-142.942	0.0	0.0	0.008
0.75L	3.000	-145.100	0.000	29.658	0.0	-0.3	0.019
0.50L	2.000	99.900	0.000	147.259	0.0	-0.5	-0.001
0.25L	1.000	154.900	0.000	19.859	0.0	-0.3	-0.020
Jt. 2	0.000	209.900	0.000	-162.541	0.0	0.0	-0.005

Maximum +ve Bending Moment 147.259 kN.m at 2.000m from joint 2
Maximum -ve Bending Moment -162.541 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 3 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	-132.202	0.000	-82.048	0.0	0.0	-0.002
0.75L	2.250	-98.452	0.000	4.447	0.0	0.0	0.004
0.50L	1.500	105.298	0.000	65.630	0.0	-0.1	-0.002
0.25L	0.750	139.048	0.000	-26.000	0.0	0.0	-0.005
Jt. 3	0.000	172.798	0.000	-142.942	0.0	0.0	0.008

Maximum +ve Bending Moment 65.630 kN.m at 1.500m from joint 3

Maximum -ve Bending Moment -142.942 kN.m at 0.000m from joint 3

RESULTS FOR COMBINATION 3 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	4.000	-89.488	0.000	-60.000	0.0	0.0	0.005
0.75L	3.000	-64.488	0.000	16.988	0.0	-0.1	0.009
0.50L	2.000	50.512	0.000	68.976	0.0	-0.2	-0.001
0.25L	1.000	75.512	0.000	5.964	0.0	-0.1	-0.009
Jt. 4	0.000	100.512	0.000	-82.048	0.0	0.0	-0.002

Maximum +ve Bending Moment 68.976 kN.m at 2.000m from joint 4
Maximum -ve Bending Moment -82.048 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 3 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 1	1.000	-70.000	0.000	-60.000	0.0	0.0	-0.017
0.75L	0.750	-65.000	0.000	-43.125	0.0	0.1	-0.015
0.50L	0.500	-60.000	0.000	-27.500	0.0	0.1	-0.013
0.25L	0.250	-55.000	0.000	-13.125	0.0	0.2	-0.012
Jt. 6	0.000	-50.000	0.000	0.000	0.0	0.2	-0.011

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 6
Maximum -ve Bending Moment -60.000 kN.m at 1.000m from joint 6

		JOB : BEAM1
		DATE:
	ANALYSIS RESULTS	SHEET: 12

RESULTS FOR COMBINATION 3 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	1.000	50.000	0.000	0.000	0.0	0.0	-0.001
0.75L	0.750	55.000	0.000	-13.125	0.0	0.0	-0.001
0.50L	0.500	60.000	0.000	-27.500	0.0	0.0	0.000
0.25L	0.250	65.000	0.000	-43.125	0.0	0.0	0.002
Jt. 5	0.000	70.000	0.000	-60.000	0.0	0.0	0.005

Maximum +ve Bending Moment 0.000 kN.m at 1.000m from joint 5
Maximum -ve Bending Moment -60.000 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 4 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	5.000	-108.789	0.000	-101.447	0.0	0.0	0.004

0.75L	3.750	-71.289	0.000	11.103	0.0	-0.3	0.015
0.50L	2.500	-33.789	0.000	76.777	0.0	-0.5	0.002
0.25L	1.250	103.711	0.000	20.576	0.0	-0.3	-0.016
Jt. 1	0.000	141.211	0.000	-132.500	0.0	0.0	-0.002

Maximum +ve Bending Moment 89.921 kN.m at 2.000m from joint 1
Maximum -ve Bending Moment -132.500 kN.m at 0.000m from joint 1

RESULTS FOR COMBINATION 4 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.000	-83.949	0.000	-57.241	0.0	0.0	0.003
0.75L	3.000	-58.949	0.000	14.208	0.0	-0.1	0.007
0.50L	2.000	56.051	0.000	60.656	0.0	-0.2	-0.002
0.25L	1.000	81.051	0.000	-7.895	0.0	-0.1	-0.008
Jt. 2	0.000	106.051	0.000	-101.447	0.0	0.0	0.004

Maximum +ve Bending Moment 60.656 kN.m at 2.000m from joint 2
Maximum -ve Bending Moment -101.447 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 4 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	-66.236	0.000	-45.948	0.0	0.0	-0.002
0.75L	2.250	-51.236	0.000	-1.896	0.0	0.0	0.002
0.50L	1.500	43.764	0.000	30.905	0.0	0.0	0.000
0.25L	0.750	58.764	0.000	-7.543	0.0	0.0	-0.002
Jt. 3	0.000	73.764	0.000	-57.241	0.0	0.0	0.003

Maximum +ve Bending Moment 30.905 kN.m at 1.500m from joint 3
Maximum -ve Bending Moment -57.241 kN.m at 0.000m from joint 3

---

		* JOB : BEAM1
		* DATE:
	* A N A L Y S I S R E S U L T S	*SHEET: 13

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RESULTS FOR COMBINATION 4 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	4.000	-116.638	0.000	-132.500	0.0	0.0	-0.011
0.75L	3.000	-91.638	0.000	-28.362	0.0	0.0	0.006
0.50L	2.000	-66.638	0.000	50.776	0.0	-0.1	0.003
0.25L	1.000	48.362	0.000	14.914	0.0	-0.1	-0.004
Jt. 4	0.000	73.362	0.000	-45.948	0.0	0.0	-0.002

Maximum +ve Bending Moment 50.776 kN.m at 2.000m from joint 4
Maximum -ve Bending Moment -132.500 kN.m at 4.000m from joint 4

RESULTS FOR COMBINATION 4 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 1	1.000	-155.000	0.000	-132.500	0.0	0.0	-0.002
0.75L	0.750	-143.750	0.000	-95.156	0.0	0.0	0.004
0.50L	0.500	-132.500	0.000	-60.625	0.0	0.0	0.008
0.25L	0.250	-121.250	0.000	-28.906	0.0	-0.1	0.010
Jt. 6	0.000	-110.000	0.000	0.000	0.0	-0.1	0.011

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 6
Maximum -ve Bending Moment -132.500 kN.m at 1.000m from joint 6

RESULTS FOR COMBINATION 4 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	1.000	110.000	0.000	0.000	0.0	-0.3	-0.024
0.75L	0.750	121.250	0.000	-28.906	0.0	-0.2	-0.024
0.50L	0.500	132.500	0.000	-60.625	0.0	-0.1	-0.021
0.25L	0.250	143.750	0.000	-95.156	0.0	-0.1	-0.017
Jt. 5	0.000	155.000	0.000	-132.500	0.0	0.0	-0.011

Maximum +ve Bending Moment 0.000 kN.m at 1.000m from joint 5
Maximum -ve Bending Moment -132.500 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 5 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	5.000	-287.174	0.000	-273.371	0.0	0.0	0.020
0.75L	3.750	-199.674	0.000	30.909	0.0	-0.9	0.050
0.50L	2.500	-112.174	0.000	225.814	0.0	-1.7	0.013
0.25L	1.250	185.326	0.000	153.845	0.0	-1.3	-0.049
Jt. 1	0.000	272.826	0.000	-132.500	0.0	0.0	-0.054

Maximum +ve Bending Moment 273.151 kN.m at 2.000m from joint 1
Maximum -ve Bending Moment -273.371 kN.m at 5.000m from joint 1

RESULTS FOR COMBINATION 5 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.000	-160.927	0.000	-97.079	0.0	0.0	0.005
0.75L	3.000	-105.927	0.000	36.348	0.0	-0.2	0.011

0.50L	2.000	139.073	0.000	114.775	0.0	-0.2	-0.006
0.25L	1.000	194.073	0.000	-51.798	0.0	0.0	-0.014
Jt. 2	0.000	249.073	0.000	-273.371	0.0	0.0	0.020

Maximum +ve Bending Moment 114.775 kN.m at 2.000m from joint 2
Maximum -ve Bending Moment -273.371 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 5 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	-169.575	0.000	-148.305	0.0	0.0	-0.011
0.75L	2.250	-135.825	0.000	-33.779	0.0	0.0	0.003
0.50L	1.500	-102.075	0.000	55.433	0.0	0.0	0.001
0.25L	0.750	101.675	0.000	-8.166	0.0	0.0	-0.003
Jt. 3	0.000	135.425	0.000	-97.079	0.0	0.0	0.005

Maximum +ve Bending Moment 55.433 kN.m at 1.500m from joint 3
Maximum -ve Bending Moment -148.305 kN.m at 3.000m from joint 3

RESULTS FOR COMBINATION 5 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	4.000	-201.049	0.000	-132.500	0.0	0.0	0.013
0.75L	3.000	-146.049	0.000	41.049	0.0	-0.4	0.022
0.50L	2.000	98.951	0.000	159.598	0.0	-0.6	-0.001
0.25L	1.000	153.951	0.000	33.147	0.0	-0.3	-0.022
Jt. 4	0.000	208.951	0.000	-148.305	0.0	0.0	-0.011

Maximum +ve Bending Moment 159.598 kN.m at 2.000m from joint 4
Maximum -ve Bending Moment -148.305 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 5 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 1	1.000	-155.000	0.000	-132.500	0.0	0.0	-0.054
0.75L	0.750	-143.750	0.000	-95.156	0.0	0.2	-0.048
0.50L	0.500	-132.500	0.000	-60.625	0.0	0.4	-0.044
0.25L	0.250	-121.250	0.000	-28.906	0.0	0.6	-0.041
Jt. 6	0.000	-110.000	0.000	0.000	0.0	0.8	-0.041

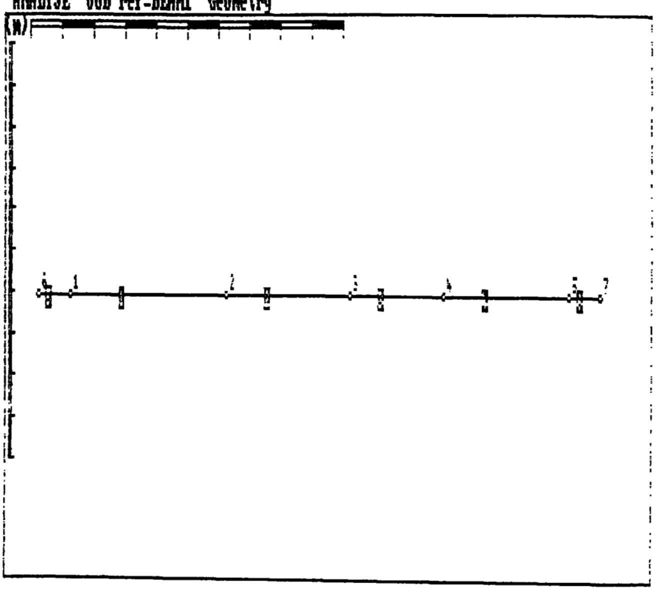
Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 6
Maximum -ve Bending Moment -132.500 kN.m at 1.000m from joint 6

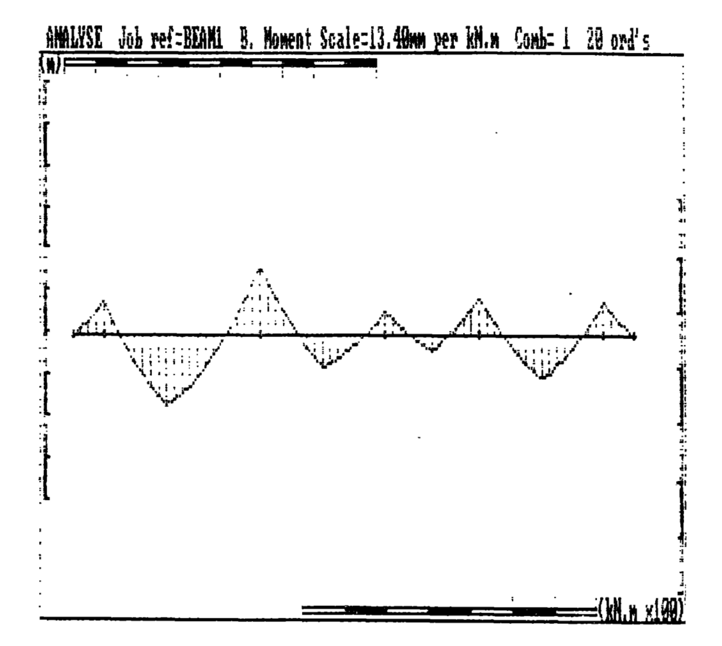
		JOB : BEAM1
		DATE:
	ANALYSIS RESULTS	SHEET: 15

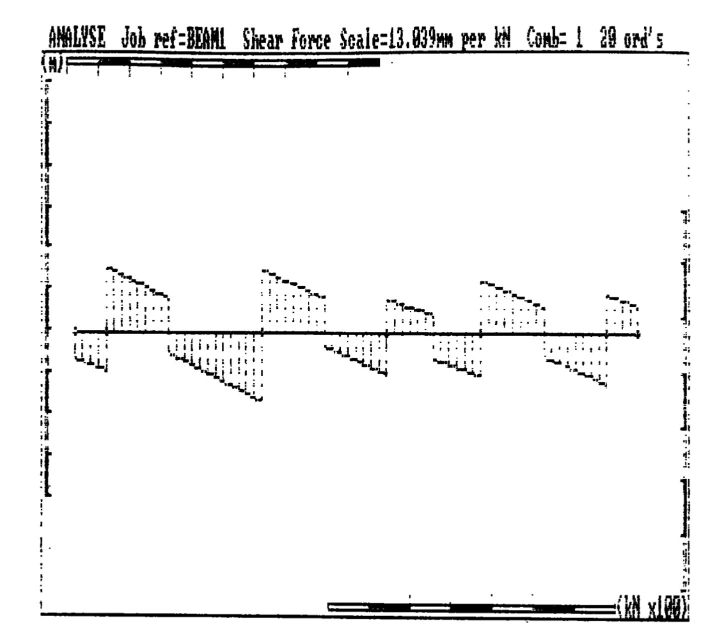
RESULTS FOR COMBINATION 5 MEMBER 6

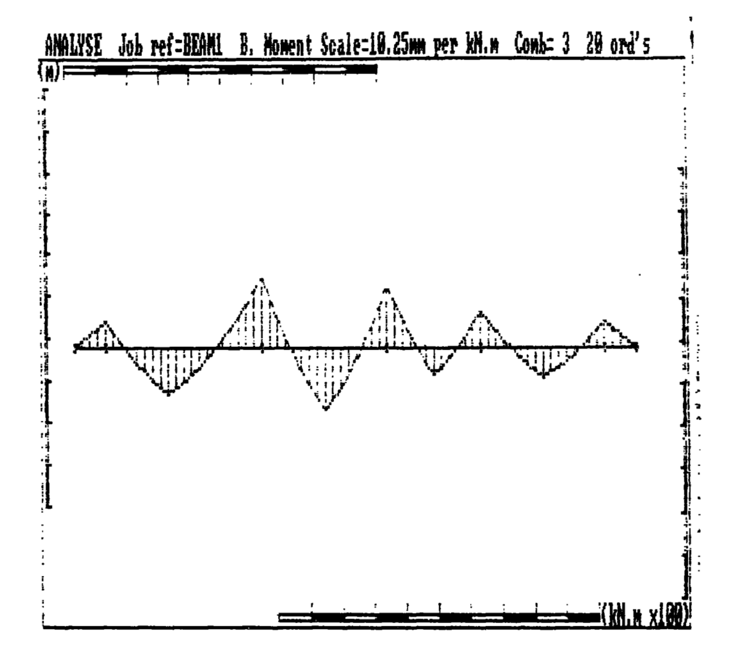
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	1.000	110.000	0.000	0.000	0.0	0.1	0.000
0.75L	0.750	121.250	0.000	-28.906	0.0	0.1	0.000
0.50L	0.500	132.500	0.000	-60.625	0.0	0.1	0.003
0.25L	0.250	143.750	0.000	-95.156	0.0	0.0	0.007
Jt. 5	0.000	155.000	0.000	-132.500	0.0	0.0	0.013

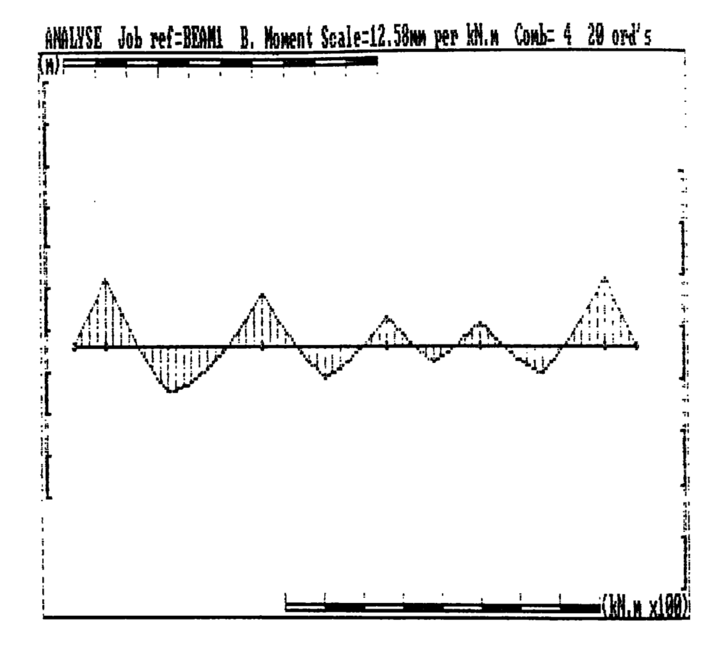
Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment -132.500 kN.m at 0.000m from joint 5

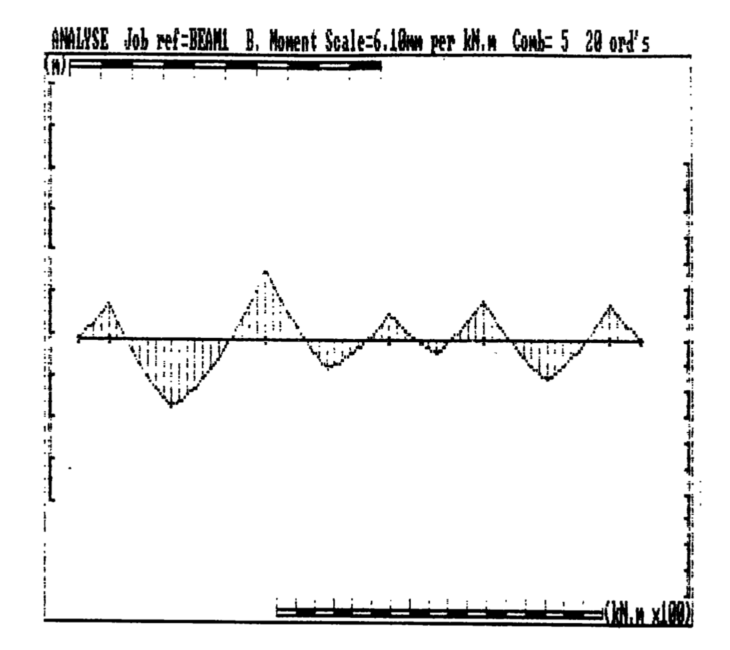



ANALYSE Job ref=BEAM1 B. Moment Scale=13.40mm per kN.m Comb= 1 20 ord's
(m)
(kN.m x100)

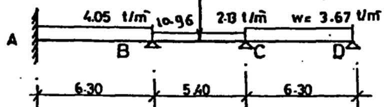

ANALYSE Job ref=BEAM1 Shear Force Scale=13.039mm per kN Comb= 1 29 ord's
(m)
(kN x100)


ANALYSE Job ref=BEAM1 B. Moment Scale=10.25mm per kN.m Comb= 3 20 ord's
(m)
(kN.m x100)


ANALYSE Job ref=BEAM1 B. Moment Scale=12.58mm per kN.m Comb= 4 20 ord's
(m)
(kN.m x100)


ANALYSE Job ref=BEAM1 B. Moment Scale=6.10mm per kN.m Comb= 5 20 ord's
(m)
(kN.m x100)

مثال : كما بالرسم كمرة مستمرة وعليها الاحمال الموضحة بالرسم (١) .



- ندخل احداثيات نقاط المنشأ وكذلك اعضائه وحالة الوصلات والقطاعات والركائز كالاتى :

Joint	X(m)	Y(m)
1	0.0	0.0
2	6.3	0.0
3	11.7	0.0
4	18.0	0.0

Member	Jt.1	Jnt.Con	Jt.2	Jnt.Con
1	1	F	2	F
2	2	F	3	F
3	3	F	4	F

- قطاع الكمرة ثابت مقاس ٢٥ سم × ٥٠ سم .

Joint	Support	X Restraint	Y Restraint	A Restraint
1	Fixed	Full	Full	Full
2	Hinge	Full	Full	Zero
3	Hinge	Full	Full	Zero
4	Hinge	Full	Full	Zero

- ندخل اسماء الأحمال (Load case names)

1- Dead Load

- ندخل قيم الاحمال المؤثرة على الاعضاء

(١) مهندس / خليل ابراهيم واكد (Design of Reinforced Concrete Beams) ص ٥٨ .

Member 1			
Dead Load	UV		40.5 Kn/m
Member 2			
Dead Load	UV		21.3 Kn/m
Dead Load	PV	2.7m	109.6 Kn
Member 3			
Dead Load	UV		36.7 Kn/m

- ندخل حالات التحميل وهى واحدة

Dead Load : 1

- نضغط [٩] ثم [٢] للبدء فى الحل فتظهر خطوات الحل تباعا على الشاشة .

- تظهر بيانات ونتائج المنشأ كالاتى :

Joint positions

Jt. No.	X coord (m)	Y coord (m)
1	0.000	0.000
2	6.300	0.000
3	11.700	0.000
4	18.000	0.000
5		

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Member location and fixity

Mem No.	J1. no.	Jnt con	X1 Coord (m)	Y1 Coord (m)	J2. no.	Jnt con	X2 Coord (m)	Y2 Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	6.300	0.000	6.300	0.000
2	2	F	6.300	0.000	3	F	11.700	0.000	5.400	0.000
3	3	F	11.700	0.000	4	F	18.000	0.000	6.300	0.000
4										

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	1250.000	260416.67	0
2			

Member Section Properties

Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	6.300	P	1	1	21000.000
2	5.400	P	1	1	21000.000
3	6.300	P<	1	1	21000.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Supports

No.	Jnt Pos	X Restraint (kN/mm)	Y Restraint (kN/mm)	A Restraint (kNm/rad)
1	1	FULL	FULL	FULL
2	2	FULL	FULL	ZERO
3	3	FULL	FULL	ZERO
4	4	FULL	FULL	ZERO

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

MEMBER LOADS   Loads & moments on Member 1 (length = 6.300m slope = 0.000deg)
Mem   No.of   Ld. Load case   Load Start Loaded (kN, kN.m or kN/m

```
No.    Loads     No.  Number & name       Type Pos(m) Len(m) Start val.    End val.
 1       1        1    1        Dead Load UV                     40.500
 2       2        2
 3       1
```

Input mode

```
  F1     F2              F6      F7      F8      F9      F10     ESC            NUMLOCK
 Help   Calc             Top     Up     Down   Commnd  Bottom  Escape            is ON

MEMBER LOADS    Loads & moments on Member 2  (length = 5.400m slope = 0.000deg)
Mem    No.of    Ld.  Load case            Load  Start Loaded  ( kN, kN.m or kN/m )
No.    Loads    No.  Number & name        Type Pos(m) Len(m) Start val.    End val.
 1       1       1    1        Dead Load UV                     21.300
 2       2       2    1        Dead Load PV   2.700            109.600
 3       1       3
```

Input mode

```
  F1     F2              F6      F7      F8      F9      F10     ESC            NUMLOCK
 Help   Calc             Top     Up     Down   Commnd  Bottom  Escape            is ON

MEMBER LOADS    Loads & moments on Member 3  (length = 6.300m slope = 0.000deg)
Mem    No.of    Ld.  Load case            Load  Start Loaded  ( kN, kN.m or kN/m )
No.    Loads    No.  Number & name        Type Pos(m) Len(m) Start val.    End val.
 1       1       1    1        Dead Load UV                     36.700
 2       2       2
 3       1
```

Input mode

```
 F1      F2                  F6      F7      F8      F9     F10     ESC           NUMLOCK
 Help    Calc                Top     Up      Down    Commnd Bottom  Escape          is ON
==========================================================================================
*                            * ******** EGYPTIAN ENGINEERS ** * JOB : W1
*----------------------------*-------------------------------*----------------
*                            * FOR                            * DATE: 9-92
*                            * COMPUTERS                      *----------------
*                            *       I N P U T    D A T A     *SHEET:     5
*-------------------------------------------------------------------------------
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==========================================================================================
FRAME GEOMETRY

No. of Joints = 4

MEMBERS
---:------ End 1 Details ------:------ End 2 Details ------:---------:---------
Mem:Jt.:C:  X coord :  Y coord :Jt.:C:  X Coord :  Y Coord :  Length :  Slope
No.:no.: :      (m) :      (m) :no.: :      (m) :      (m) :     (m) :  (deg)
---:---:-:----------:----------:---:-:----------:----------:---------:---------
  1:  1:F:    0.000 :    0.000 :  2:F:    6.300 :    0.000 :   6.300 :   0.00
  2:  2:F:    6.300 :    0.000 :  3:F:   11.700 :    0.000 :   5.400 :   0.00
  3:  3:F:   11.700 :    0.000 :  4:F:   18.000 :    0.000 :   6.300 :   0.00
==========================================================================================
TABLE OF SECTIONS

Section :    Area:   Inertia: Rectangular Elements (if specified)
Number  :   (cm2):     (cm4): No:  D (mm):   B (mm):   Y (mm)
--------:---------:----------:---:---------:---------:-------------
   1    : 1250.00: 260416.7:   :         :         :
--------:---------:----------:---:---------:---------:-------------
==========================================================================================
SUMMARY OF MEMBER PROPERTIES

Member 1 - 3 PRISMATIC : Section Number  1 : Modulus E =   21000.0 N/mm2
==========================================================================================
SUPPORTS

No. of Supports =  4

  Joint : X Restraint : Y Restraint : Angular Restraint
 Number :   ( kN/mm ) :   ( kN/mm ) :   ( kN.m/radian )
--------:-------------:-------------:-------------------
    1   :     FULL    :     FULL    :      FULL
    2   :     FULL    :     FULL    :      ZERO
    3   :     FULL    :     FULL    :      ZERO
    4   :     FULL    :     FULL    :      ZERO
```

```
================================================================================
APPLIED LOADS AND MOMENTS

MEMBER 1

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:    Length:   Start Value:       End Value
---:-----------------:----:----------:----------:---------------:---------------
  1:      Dead Load: UV :           :          :    40.500 kN/m:
--------------------------------------------------------------------------------
MEMBER 2

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:    Length:   Start Value:       End Value
---:-----------------:----:----------:----------:---------------:---------------
  1:      Dead Load: UV :           :          :    21.300 kN/m:
  1:             '' : PV :  2.700 m :          :   109.600 kN  :
--------------------------------------------------------------------------------


================================================================================
*                               * ******** EGYPTIAN ENGINEERS ** * JOB : W1
*-------------------------------*--------------------------------*---------------
*                               * FOR                            * DATE: 9-92
*                               * COMPUTERS                      *---------------
*                               *     I N P U T   D A T A        *SHEET:     6
*-------------------------------------------------------------------------------
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================================================================================
APPLIED LOADS AND MOMENTS continued

MEMBER 3

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:    Length:   Start Value:       End Value
---:-----------------:----:----------:----------:---------------:---------------
  1:      Dead Load: UV :           :          :    36.700 kN/m:
================================================================================
COMBINATIONS

                     : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E    : Combination Number
No : Name            :  1
---------------------:-----
  1:      Dead Load:1.000
================================================================================
```

```
==============================================================================
*                            * ******** EGYPTIAN ENGINEERS ** * JOB : W1
*----------------------------*---------------------------------*---------------
*                            * FOR                              * DATE: 9-92
*                            * COMPUTERS                        *---------------
*                            * A N A L Y S I S  R E S U L T S *SHEET:      7
*------------------------------------------------------------------------------
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==============================================================================
RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

 Joint No.  dx(mm)    dy(mm)    0(rad)      Px (kN)      Py (kN)     M (kN.m)
     1        0.00      0.00    0.0000        0.000      130.611      140.329
     2        0.00      0.00    0.0004        0.000      230.198        0.000
     3        0.00      0.00   -0.0010        0.000      259.506        0.000
     4        0.00      0.00    0.0040        0.000       90.665        0.000
------------------------------------------------------------------------------
Summation of Forces and Moments

                    Px (kN)     Py (kN)     Mo (kN.m)
Member Loads          0.000    -710.980    -6258.771
Joint Loads           0.000       0.000        0.000
                  ------------------------------------
Reactions             0.000    -710.980    -6258.771
Summation             0.000     710.980     6258.771
                  ------------------------------------
Summation             0.000       0.000        0.000
------------------------------------------------------------------------------
Maxima for Member 1

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) -------
```

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	130.611	0.000	0.000	70.278	3.225	-140.329	0.000

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-118.962	0.000	0.000	86.436	2.700	-157.122	5.400

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	140.545	0.000	0.000	111.991	3.830	-157.122	0.000

RESULTS FOR COMBINATION 1 MEMBER 1

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	6.300	-124.539	0.000	-121.204	0.0	0.0	0.021
0.75L	4.725	-60.752	0.000	24.713	0.0	-2.0	0.087
0.50L	3.150	3.036	0.000	70.164	0.0	-3.3	-0.005
0.25L	1.575	66.823	0.000	15.150	0.0	-1.8	-0.089
Jt. 1	0.000	130.611	0.000	-140.329	0.0	0.0	0.000

Maximum +ve Bending Moment 70.278 kN.m at 3.225m from joint 1
Maximum -ve Bending Moment -140.329 kN.m at 0.000m from joint 1

*	* ******** EGYPTIAN ENGINEERS **	* JOB : W1
*	* FOR * COMPUTERS * A N A L Y S I S R E S U L T S	* DATE: 9-92 *SHEET: 8

RESULTS FOR COMBINATION 1 MEMBER 2

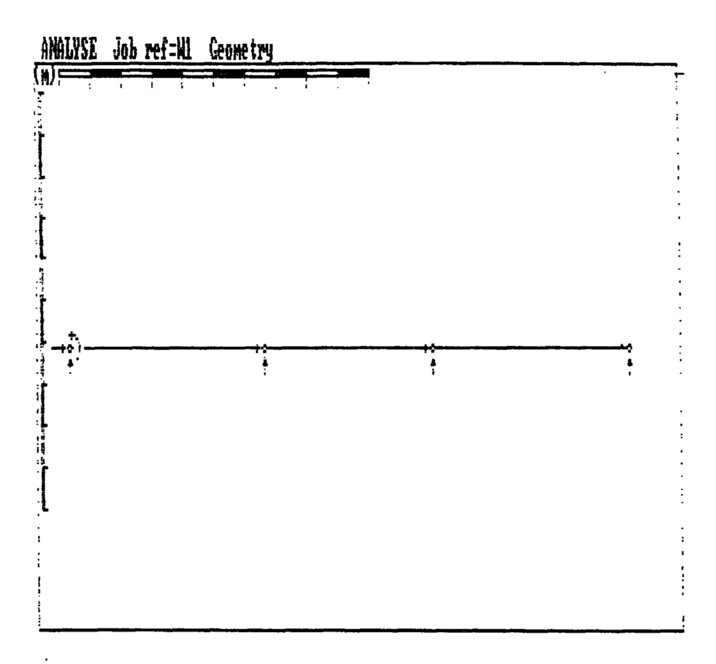
Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	5.400	-118.962	0.000	-157.122	0.0	0.0	-0.055
0.75L	4.050	-90.207	0.000	-15.933	0.0	-0.5	0.063
0.50L	2.700	-61.452	0.000	86.436	0.0	-1.6	0.008
0.25L	1.350	76.903	0.000	2.026	0.0	-0.8	-0.059
Jt. 2	0.000	105.658	0.000	-121.204	0.0	0.0	0.021

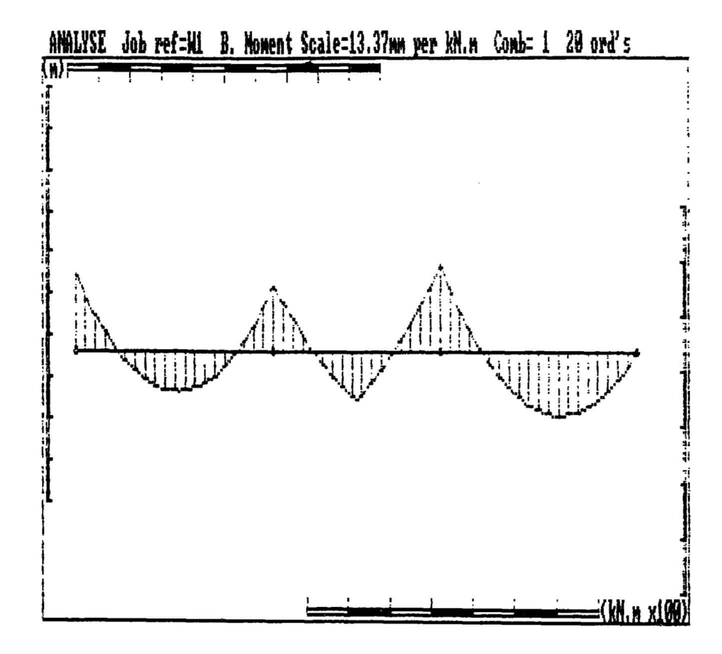
Maximum +ve Bending Moment 86.436 kN.m at 2.700m from joint 2
Maximum -ve Bending Moment -157.122 kN.m at 5.400m from joint 2

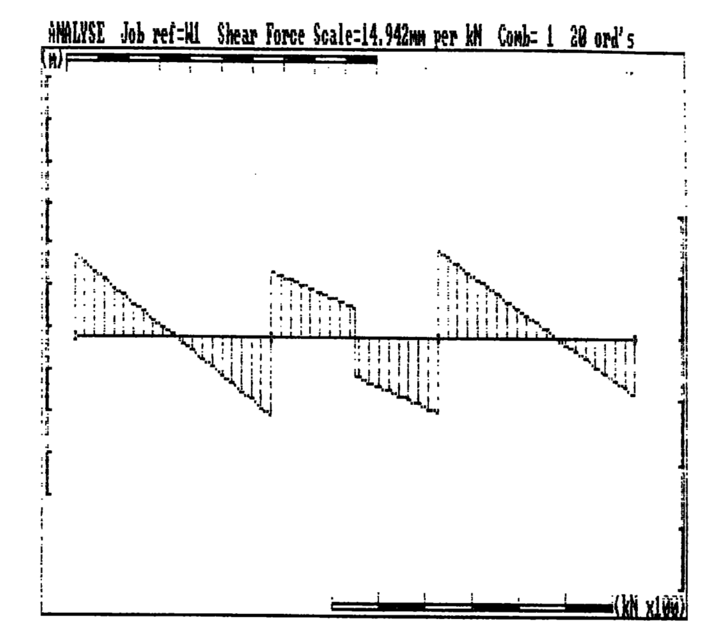
RESULTS FOR COMBINATION 1 MEMBER 3

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	6.300	-90.665	0.000	0.000	0.0	0.0	0.228
0.75L	4.725	-32.863	0.000	97.278	0.0	-5.4	0.135
0.50L	3.150	24.940	0.000	103.517	0.0	-6.6	-0.043
0.25L	1.575	82.742	0.000	18.717	0.0	-3.6	-0.157
Jt. 3	0.000	140.545	0.000	-157.122	0.0	0.0	-0.055

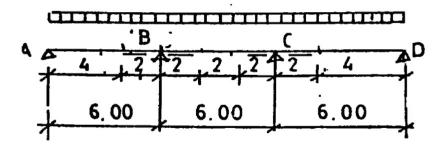
Maximum +ve Bending Moment 111.991 kN.m at 3.830m from joint 3
Maximum -ve Bending Moment -157.122 kN.m at 0.000m from joint 3


ANALYSE Job ref=W1 Geometry
(m)


ANALYSE Job ref=W1 B. Moment Scale=13.37mm per kN.m Comb= 1 20 ord's
(m)
(kN.m x100)


ANALYSE Job ref=W1 Shear Force Scale=14.942mm per kN Comb= 1 20 ord's
(m)
(kN x100)

مثال : كما بالرسم كمرة مستمرة وعليها الأحمال الموضحة بالرسم [١] .

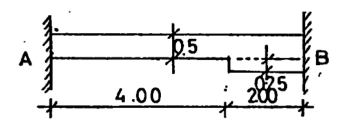


– ندخل احداثيات نقاط المنشأ وكذلك أعضائه وحالة الوصلات والقطاعات والركائز كالاتى :

Joint	X(m)	Y(m)
1	0.0	0.0
2	6	0.0
3	12	0.0
4	18	0.0

Member	Jt.1	Jnt.Con	Jt.2	Jnt.Con
1	1	F	2	F
2	2	F	3	F
3	3	F	4	F

قطاع الكمرة كما بالرسم ابعاده ٢٥ سم × ٥٠/٧٥ سم



---

(١) مهندس / خليل ابراهيم واكد (Design of Reinforced Concrete Beams) ص ٢٢٨ .

Joint	Support	X Restraint	Y Restraint	A Restraint
1	Hinge	Full	Full	Zero
2	Hinge	Full	Full	Zero
3	Hinge	Full	Full	Zero
4	Hinge	Full	Full	Zero

- ندخل اسماء الاحمال (Load case names)

1- Dead Load

- ندخل قيم الاحمال المؤثرة على الاعضاء ١ ، ٢ ، ٣

Dead Load UV 40 Kn/m

- ندخل حالات التحميل وهى واحدة

Dead Load : 1

- نضغط [٩] ثم [٢] للبدء فى الحل فتظهر خطوات الحل تباعا على الشاشة .

- تظهر بيانات ونتائج المنشا كالاتي :

Joint positions

Jt. No.	X coord (m)	Y coord (m)
1	0.000	0.000
2	6.000	0.000
3	12.000	0.000
4	18.000	0.000
5		

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Member location and fixity

Mem No.	J1. no.	Jnt con	X1 Coord (m)	Y1 Coord (m)	J2. no.	Jnt con	X2 Coord (m)	Y2 Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	6.000	0.000	6.000	0.000
2	2	F	6.000	0.000	3	F	12.000	0.000	6.000	0.000
3	3	F	12.000	0.000	4	F	18.000	0.000	6.000	0.000
4										

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	1250.000	260416.67	1
2	1875.000	878906.3	1
3			

Elements of Section no. 1

Elem No.	Y-dim (mm)	B-dim (mm)	D-dim (mm)
1	-250.000<	250.000	500.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	1250.000	260416.67	1
2	1875.000	878906.30	1
3			

Elements of Section no. 2

Elem No.	Y-dim (mm)	B-dim (mm)	D-dim (mm)
1	-375.000	250.000	750.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	1250.000	260416.67	1
2	1875.000	878906.33	1
3	0.000		

Member Section Properties

Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	6.000	N	2		21000.000
2	6.000	N	3		21000.000
3	6.000	N	2		21000.000

```
Segment(s) of Member 1
Seg.  Segment Section No.
No.    Length  End1 End2
 1      4.000    1    1
 2      2.000    2    2

 Input mode
```

```
  F1     F2          F6     F7     F8     F9     F10    ESC          NUMLOCK
 Help   Calc        Top    Up    Down  Commnd Bottom Escape          is ON

Table of Sections                          Member Section Properties
Section    Area      Inertia  No. of    Mem  Member      No. Sec.    Modulus E
No.       (cm2)       (cm4)  Elements  No.  Length N/P Seg No.       (N/mm2)
  1    1250.000   260416.67     1        1     6.000 N    2         21000.000
  2    1875.000   878906.30     1        2     6.000 N    3         21000.000
  3       0.000                          3     6.000 N    2         21000.000
```

```
Segment(s) of Member 2
Seg.  Segment Section No.
No.    Length  End1 End2
 1      2.000    2    2
 2      2.000    1    1
 3      2.000    2    2

 Input mode
```

```
  F1     F2          F6     F7     F8     F9     F10    ESC          NUMLOCK
 Help   Calc        Top    Up    Down  Commnd Bottom Escape          is ON

Table of Sections                          Member Section Properties
Section    Area      Inertia  No. of    Mem  Member      No. Sec.    Modulus E
No.       (cm2)       (cm4)  Elements  No.  Length N/P Seg No.       (N/mm2)
  1    1250.000   260416.67     1        1     6.000 N    2         21000.000
  2    1875.000   878906.30     1        2     6.000 N    3         21000.000
  3       0.000                          3     6.000 N    2         21000.000
```

```
Segment(s) of Member 3
Seg.  Segment Section No.
No.    Length  End1 End2
 1      2.000<   2    2
```

2 4.000 1 1

Input mode

```
  F1      F2              F6      F7      F8      F9      F10     ESC          NUMLOCK
 Help    Calc            Top     Up      Down   Commnd  Bottom  Escape         is ON
```

Supports

No.	Jnt Pos	X Restraint (kN/mm)	Y Restraint (kN/mm)	A Restraint (kNm/rad)
1	1<	FULL	FULL	ZERO
2	2	FULL	FULL	ZERO
3	3	FULL	FULL	ZERO
4	4	FULL	FULL	ZERO

Input mode

```
  F1      F2              F6      F7      F8      F9      F10     ESC          NUMLOCK
 Help    Calc            Top     Up      Down   Commnd  Bottom  Escape         is ON
```

Global load case names

No.	Load Case Name
1	Dead Load
2	

Input mode

```
 F1      F2                 F6      F7      F8       F9      F10     ESC           NUMLOCK
Help    Calc               Top     Up     Down   Commnd  Bottom  Escape           is ON

Global load case names

No.    Load Case Name
 1          Dead Load
 2
```

Input mode

```
 F1      F2                 F6      F7      F8       F9      F10     ESC           NUMLOCK
Help    Calc               Top     Up     Down   Commnd  Bottom  Escape           is ON

MEMBER LOADS    Loads & moments on Member 1  (length = 6.000m slope = 0.000deg)
Mem    No.of    Ld.  Load case           Load  Start Loaded  ( kN, kN.m or kN/m )
No.    Loads    No.  Number & name       Type Pos(m) Len(m) Start val.   End val.
 1       1       1   1<       Dead Load UV                      40.000
 2       1       2
 3       1
```

Input mode

```
 F1      F2                 F6      F7      F8       F9      F10     ESC           NUMLOCK
Help    Calc               Top     Up     Down   Commnd  Bottom  Escape           is ON

MEMBER LOADS    Loads & moments on Member 2  (length = 6.000m slope = 0.000deg)
Mem    No.of    Ld.  Load case           Load  Start Loaded  ( kN, kN.m or kN/m )
No.    Loads    No.  Number & name       Type Pos(m) Len(m) Start val.   End val.
 1       1       1   1<       Dead Load UV                      40.000
 2       1       2
```

3 1

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

MEMBER LOADS Loads & moments on Member 3 (length = 6.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld. No.	Load case Number & name	Load Type	Start Pos(m)	Loaded Len(m)	(kN, kN.m or kN/m) Start val.	End val.
1	1	1	1< Dead Load	UV			40.000	
2	1	2						
3	1							

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Safety Factors for Combination 1

Load Case Number and name	Safety factor
1 Dead Load	1.000<

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Safety Factors for Combination 1

Load Case Number and name		Safety factor
1	Dead Load	1.000<

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

* JOB : W2

* DATE:

I N P U T D A T A

*SHEET: 9

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FRAME GEOMETRY

No. of Joints = 4

MEMBERS

	End 1 Details			End 2 Details				
Mem No.	Jt. no.	C	X coord (m)	Y coord (m)	Jt. no.	C	X Coord (m)	Y Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	6.000	0.000	6.000	0.00
2	2	F	6.000	0.000	3	F	12.000	0.000	6.000	0.00
3	3	F	12.000	0.000	4	F	18.000	0.000	6.000	0.00

TABLE OF SECTIONS

Section Number	Area: (cm2):	Inertia: (cm4):	Rectangular Elements (if specified) No:	D (mm):	B (mm):	Y (mm)
1	1250.00	260416.7	1	500.00	250.00	-250.00
2	1875.00	878906.3	1	750.00	250.00	-375.00

SUMMARY OF MEMBER PROPERTIES

Member 1 NON PRISMATIC : Modulus E = 21000.0 N/mm2

Segment	Length	End 1 Section No.	End 2 Section No.
1	4.000 m	1	1
2	2.000 m	2	2

Member 2 NON PRISMATIC : Modulus E = 21000.0 N/mm2

Segment	Length	End 1 Section No.	End 2 Section No.
1	2.000 m	2	2
2	2.000 m	1	1
3	2.000 m	2	2

Member 3 NON PRISMATIC : Modulus E = 21000.0 N/mm2

Segment	Length	End 1 Section No.	End 2 Section No.
1	2.000 m	2	2
2	4.000 m	1	I

SUPPORTS

No. of Supports = 4

Joint Number	X Restraint (kN/mm)	Y Restraint (kN/mm)	Angular Restraint (kN.m/radian)
1	FULL	FULL	ZERO
2	FULL	FULL	ZERO
3	FULL	FULL	ZERO
4	FULL	FULL	ZERO

APPLIED LOADS AND MOMENTS

MEMBERS 1 - 2

LOAD CASE No : Name	LOAD: Type:	POSITION Start:	Length:	LOAD/MOMENT Start Value:	End Value
1: Dead Load	UV			40.000 kN/m	

MEMBER 3

LOAD CASE No : Name	LOAD: Type:	POSITION Start:	Length:	LOAD/MOMENT Start Value:	End Value
1: Dead Load	UV			40.060 kN/m	

COMBINATIONS

LOAD CASE No : Name	TABULATED VALUES OF PARTIAL SAFETY FACTORS : Combination Number 1
1: Dead Load	1.000

*	*	* JOB : W2
*	*	* DATE:
*	* A N A L Y S I S R E S U L T S	*SHEET: 11

RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	O(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0033	0.000	88.909	0.000
2	0.00	0.00	0.0013	0.000	271.091	0.000
3	0.00	0.00	-0.0013	0.000	271.091	0.000
4	0.00	0.00	0.0033	0.000	88.909	0.000

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-720.000	-6480.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-720.000	-6480.000
Summation	0.000	720.000	6480.000
Summation	0.000	0.000	0.000

Maxima for Member 1

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-151.091	0.000	0.000	98.810	2.223	-186.547	6.00(

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	120.000	0.000	0.000	0.000	0.000	-186.547	0.00(

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	151.091	0.000	0.000	98.810	3.777	-186.547	0.00(

RESULTS FOR COMBINATION 1 MEMBER 1

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	6.000	-151.091	0.000	-186.547	0.0	0.0	0.072
0.75L	4.500	-91.091	0.000	-4.910	0.0	-2.6	0.113
0.50L	3.000	-31.091	0.000	86.726	0.0	-5.0	0.043
0.25L	1.500	28.909	0.000	88.363	0.0	-4.2	-0.107
Jt. 1	0.000	88.909	0.000	0.000	0.0	0.0	-0.188

Maximum +ve Bending Moment 98.810 kN.m at 2.223m from joint 1
Maximum -ve Bending Moment -186.547 kN.m at 6.000m from joint 1

		* JOB : W2
		* DATE:
	* A N A L Y S I S R E S U L T S	*SHEET: 12

RESULTS FOR COMBINATION 1 MEMBER 2

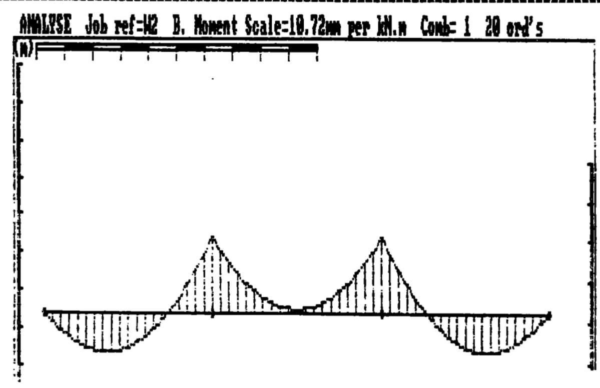
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	6.000	-120.000	0.000	-186.547	0.0	0.0	-0.072
0.75L	4.500	-60.000	0.000	-51.547	0.0	1.1	-0.020
0.50L	3.000	0.000	0.000	-6.547	0.0	1.3	0.000
0.25L	1.500	60.000	0.000	-51.547	0.0	1.1	0.020
Jt. 2	0.000	120.000	0.000	-186.547	0.0	0.0	0.072

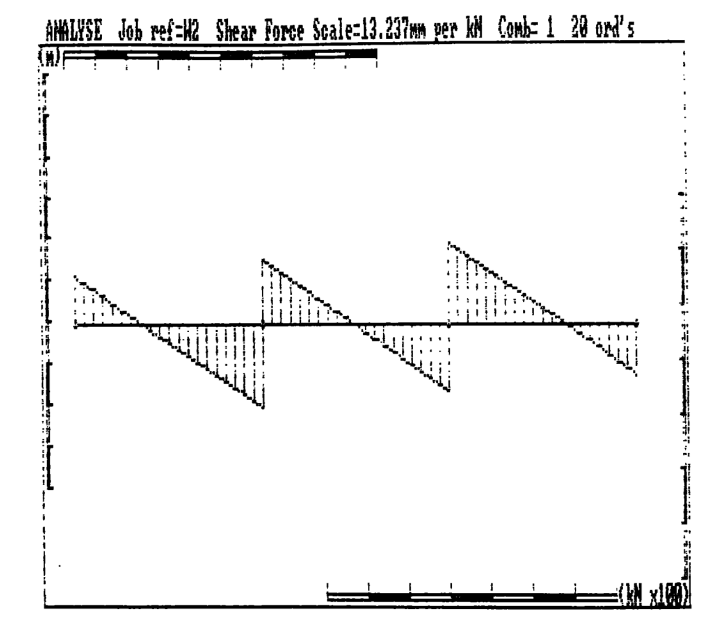
Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 2
Maximum -ve Bending Moment -186.547 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	6.000	-88.909	0.000	0.000	0.0	0.0	0.188
0.75L	4.500	-28.909	0.000	88.363	0.0	-4.2	0.107
0.50L	3.000	31.091	0.000	86.726	0.0	-5.0	-0.043
0.25L	1.500	91.091	0.000	-4.910	0.0	-2.6	-0.113
Jt. 3	0.000	151.091	0.000	-186.547	0.0	0.0	-0.072

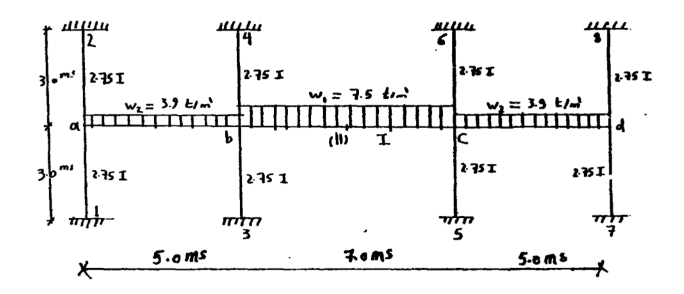
Maximum +ve Bending Moment 98.810 kN.m at 3.777m from joint 3
Maximum -ve Bending Moment -186.547 kN.m at 0.000m from joint 3




ANALYSE Job ref=W2 Shear Force Scale=13.237mm per kN Comb= 1 20 ord's
(m)
(kN x100)

مثال : كما بالرسم أطار هيكلى (Frame) وعليه أحمال موزعة بانتظام

(Uniform Dist.) DL = 4 t / m , LL = 3.5 t / m



وباستخدام المثال السابق يمكن حل البلاطات المسطحة (Flat slab) على هيئة أطار هيكلى (Frame) .

– قطاع الأعمدة ٦٠ × ٦٠ سم والبلاطة ٦٠٠ سم فى الاتجاه العمودى على الصفحة وبسمك ٢٠ سم .

– نعد البيانات الازمة للحل وهى :

١– نقاط المنشا (Joint Coordinates)

Jt	1	2	3	4	5	6	7	8	9	10	11	12
x	0	0	0	5	5	5	12	12	12	17	17	17
y	0	3	6	0	3	6	0	3	6	0	3	6

وتظهر الشاشة فى الصورة التالية :

Joint positions

Jt. NO.	X coord (m)	Y coord (m)
1	0.000	0.000
2	0.000	3.000
3	0.000	6.000
4	5.000	0.000
5	5.000	3.000
6	5.000	6.000
7	12.000	0.000
8	12.000	3.000
9	12.000	6.000
10	17.000	0.000
11	17.000	3.000
12	17.000	6.000
13		

– نضغط [Esc] للتسجيل وندخل أعضاء المنشأ طبقا للجدول التالى :

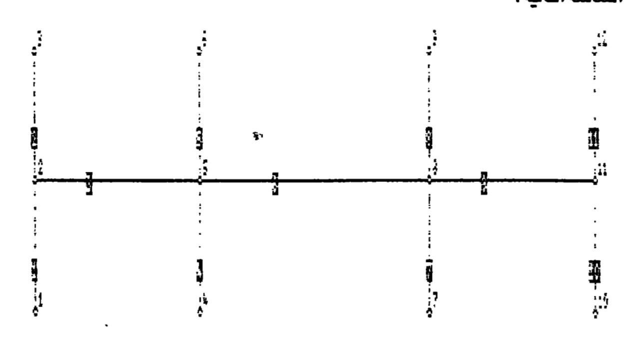
Member	Jt1	Jnt.con	Jt.2	Jnt.con
1	1	F	2	F
2	2	F	3	F
3	2	F	5	F
4	4	F	5	F
5	5	F	6	F
6	5	F	8	F
7	7	F	8	F
8	8	F	9	F
9	8	F	11	F
10	10	F	11	F
11	11	F	12	F

وتظهر الشاشة فى الصورة التالية :

Member Location and fixity

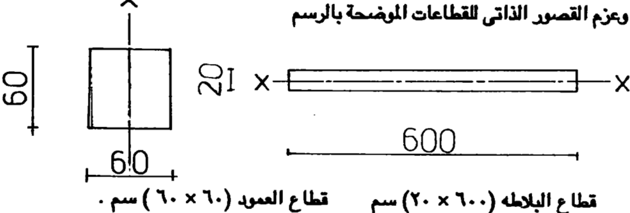
Mem No.	J1. No.	Jnt Con	X1 Coord (m)	Y1 Coord (m)	J2. no.	Jnt con	X2 Coord (m)	Y2 Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	0.000	3.000	3.000	90.000
2	2	F	0.000	3.000	3	F	0.000	6.000	3.000	90.000
3	2	F	0.000	3.000	5	F	5.000	3.000	5.000	0.000
4	4	F	5.000	0.000	5	F	5.000	3.000	3.000	90.000
5	5	F	5.000	3.000	6	F	5.000	6.000	3.000	90.000
6	5	F	5.000	3.000	8	F	12.000	3.000	7.000	0.000
7	7	F	12.000	0.000	8	F	12.000	3.000	3.000	90.000
8	8	F	12.000	3.000	9	F	12.000	6.000	3.000	90.000
9	8	F	12.000	3.000	11	F	17.000	3.000	5.000	0.000
10	10	F	17.000	0.000	11	F	17.000	3.000	3.000	90.000
11	11	F	17.000	3.000	12	F	17.000	6.000	3.000	90.000
12										

- نضغط [ESC] للعودة للشاشة الرئيسية ثم [D] للتأكد من صحة البيانات فتظهر الشاشة التالية :



بعد التأكد من الرسم الخاص بالمنشأ نعود للشاشة الرئيسية بالضغط على [ESC] .

- نضغط [٣] خصائص قطاعات وأعضاء المنشأ (Properties) ونحسب المساحة وعزم القصور الذاتى للقطاعات الموضحة بالرسم



قطاع البلاطه (٦٠٠ x ٢٠) سم   قطاع العمود (٦٠ x ٦٠) سم .

ملاحظة : يحسب عزم القصور الذاتى حول المحور الذى تدور حوله عزوم الانحناء (Bending Moments)

Table of Sections				Member Section Properties					
Scction NO.	Area (cm2)	Inertia (cm4)	No. of Elements	Mem No.	Member Length	N/p	No. Seg	Sec. No.	modulus E (N/mm2)
1	3600.000	1080000.00	1	1	3.000	P<	1	1	21000.000
2	12000.000	400000.00	1	2	3.000	p	1	1	21000.000
3				3	5.000	p	1	2	21000.000
				4	3.000	p	1	1	21000.000
				5	3.000	p	1	1	21000.000
				6	7.000	p	1	2	21000.000
				7	3.000	p	1	1	21000.000
				8	3.000	p	1	1	21000.000

Input mode

Table of Sections				Member Section Properties					
Scction NO.	Area (cm2)	Inertia (cm4)	No. of Elements	Mem No.	Member Length	N/p	No. Seg	Sec. No.	modulus E (N/mm2)
1	3600.000	1080000.00	1	4	3.000	P<	1	1	21000.000
2	12000.000	400000.00	1	5	3.000	P	1	1	21000.000
3				6	7.000	P	1	2	21000.000
				7	3.000	P	1	1	21000.000
				8	3.000	P	1	1	21000.000
				9	5.000	P	1	2	21000.000
				10	3.000	P	1	1	21000.000
				11	3.000	P	1	1	21000.000

Input mode

الاعضاء ١ ، ٢ ، ٤ ، ٥ ، ٧ ، ٨ ، ١٠ ، ١١ لها قطاع الأعمدة ٦٠ سم × ٦٠ سم (رقم ١) والباقى ٣ ، ٦ ، ٩ لها قطاع البلاطة ٦٠٠ سم × ٢٠ سم (رقم ٢) .

– نضغط [ESC] للتسجيل والخروج للشاشة الرئيسية .

- نضغط [٤] الركائز Supports .

الركائز ١ ، ٣ ، ٤ ، ٦ ، ٧ ، ٩ ، ١٠ ، ١٢ كلها ثابتة (Fixed Supports)

Supports

No.	Joint Pos	X Restraint (KN/mm)	Y Restraint (KN/mm)	A Restraint (KNm/rad)
1	1	Full	Full	Full
2	3	Full	Full	Full
3	4	Full	Full	Full
4	6	Full	Full	Full
5	7	Full	Full	Full
6	9	Full	Full	Full
7	10	Full	Full	Full
8	12	Full	Full	Full
9				

- نضغط [ESC] للتسجيل والعودة للشاشة الرئيسية .

- نضغط [5] اسماء الاحمال (Load case names) وهى حمل ميت على البلاطة كلها (Dead Load) و ثلاثة أحمال حية (Live Loads) .

تؤثر على الأعضاء ٣ ، ٦ ، ٩ وهى على الترتيب
Live Load 1 , Live Load2 , Live Load3

وتظهر الشاشة فى الصورة التالية :

Global Load Case Names

No.	Load Case Name
1	Dead Load<
2	Live Load 1
3	Live Load 2
4	Live Load 3
5	

– نضغط [ESC] للتسجيل والعودة للشاشة الرئيسية .

– نضغط [٦] لادخال الأحمال المؤثرة علي الأعضاء [6 Member Loads]

- Member (3)

1- Dead Load	UV	40 Kn/m`
2- Live Load1	UV	35 Kn/m`

- Member (6)

1- Dead Load	UV	40 Kn/m`
2- Live Load2	UV	35 Kn/m`

- Member (9)

1- Dead Load	UV	40 Kn/m`
2- Live Load3	UV	35 Kn/m`

وتظهر الشاشات التالية :

MEMBER LOADS Loads & moments on Member 3 (Length=5.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld. No.	Load case Number	& name	Load Type	Start Pos (m)	Loaded Len (m)	(KN, KN.m or KN/m) Start val .	End val .
1	0	1	1	Dead Load	UV			40.000	
2	0	2	2	LIVE LOAD 1	UV			35.000	
3	2	3							
4	0								
5	0								
6	2								
7	0								
8	0								
9	2								
10	0								
11	0								

MEMBER LOADS Loads & moments on Member 6 (Length=7.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld. No.	Load case Number	& name	Load Type	Start Pos (m)	Loaded Len (m)	(KN, KN.m or KN/m) Start val .	End val .
1	0	1	1	Dead Load	UV			40.000	
2	0	2	3	LIVE LOAD 2	UV			35.000	
3	2	3							
4	0								
5	0								
6	2								
7	0								
8	0								
9	2								
10	0								
11	0								

MEMBER LOADS Loads & moments on Member 9 (Length=5.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld. No.	Load case Number	& name	Load Type	Start Pos (m)	Loaded Len (m)	(KN, KN.m or KN/m) Start val .	End val .
1	0	1	1	Dead Load	UV			40.000	
2	0	2	4	LIVE LOAD 3	UV			35.000	
3	2	3							
4	0								
5	0								
6	2								
7	0								
8	0								
9	2								
10	0								
11	0								

- نضغط [ESC] للعودة للشاشة الرئيسية .

- نضغط [٨] حالات التحميل (8 Combinations)

نضخل حالات التحميل كما بالرسم

Case (1) : (DL + LL1)

Case (2) : (DL + LL2)

Case (3) : (DL + LL1 + LL2)

Case (4) : (DL + LL1 + LL2 + LL3)

Case (5) : (DL + LL1 + LL3)

تظهر الشاشات التالية :

Safety Factors for Combination 1

Load Case Number and name		Safety factor
1	Dead Load	1.000<
2	LIVE LOAD 1	1.000
3	LIVE LOAD 2	0.000
4	LIVE LOAD 3	0.000

Safety Factors for Combination 2

Load Case Number and name		Safety factor
1	Dead Load	1.000<
2	LIVE LOAD 1	0.000
3	LIVE LOAD 2	1.000
4	LIVE LOAD 3	0.000

Safety Factors for Combination 3

Load Case Number and name		Safety factor
1	Dead Load	1.000<
2	LIVE LOAD 1	1.000
3	LIVE LOAD 2	1.000
4	LIVE LOAD 3	0.000

Safety Factors for Combination 4

Load Case Number and name		Safety factor
1	Dead Load	1.000<
2	LIVE LOAD 1	1.000
3	LIVE LOAD 2	1.000
4	LIVE LOAD 3	1.000

Safety Factors for Combination 5		
Load Case		Safety
Number and name		factor
1	Dead Load	1.000<
2	LIVE LOAD 1	1.000
3	LIVE LOAD 2	0.000
4	LIVE LOAD 3	1.000

- نضغط [ESC] للتسجيل والعودة للشاشة الرئيسية .
- نضغط [٩] الحل (9 Analysis / Results)
- نضغط [٢] لمشاهدة خطوات الحل على الشاشة (2 View results on screen)
- تظهر نتائج الأعضاء كلها ومنها رقم ٢ ، ٦ ، ٩ لحالات التحميل من ١ إلى ٥ .

Joint positions

Jt. No.	X coord (m)	Y coord (m)
1	0.000	0.000
2	0.000	3.000
3	0.000	6.000
4	5.000	0.000
5	5.000	3.000
6	5.000	6.000
7	12.000	0.000
8	12.000	3.000
9	12.000	6.000
10	17.000	0.000
11	17.000	3.000
12	17.000	6.000
13		

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Member location and fixity

Mem	J1. Jnt	X1 Coord	Y1 Coord	J2. Jnt	X2 Coord	Y2 Coord	Length	Slope

No.	no.	con	(m)	(m)	no.	con	(m)	(m)	(m)	(deg)
1	1	F	0.000	0.000	2	F	0.000	3.000	3.000	90.000
2	2	F	0.000	3.000	3	F	0.000	6.000	3.000	90.000
3	2	F	0.000	3.000	5	F	5.000	3.000	5.000	0.000
4	4	F	5.000	0.000	5	F	5.000	3.000	3.000	90.000
5	5	F	5.000	3.000	6	F	5.000	6.000	3.000	90.000
6	5	F	5.000	3.000	8	F	12.000	3.000	7.000	0.000
7	7	F	12.000	0.000	8	F	12.000	3.000	3.000	90.000
8	8	F	12.000	3.000	9	F	12.000	6.000	3.000	90.000
9	8	F	12.000	3.000	11	F	17.000	3.000	5.000	0.000
10	10	F	17.000	0.000	11	F	17.000	3.000	3.000	90.000
11	11	F	17.000	3.000	12	F	17.000	6.000	3.000	90.000
12										

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	3600.000	1080000.00	1
2	12000.000	400000.00	1
3			

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK.
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	3600.000	1080000.00	1
2	12000.000	400000.00	1
3			

Member Section Properties

Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	3.000	P	1	1	21000.000
2	3.000	P	1	1	21000.000
3	5.000	P	1	2	21000.000
4	3.000	P	1	1	21000.000
5	3.000	P	1	1	21000.000
6	7.000	P	1	2	21000.000
7	3.000	P	1	1	21000.000

8	3.000 P	1	1	21000.000

Input mode

F1 Help	F2 Calc	F6 Top	F7 Up	F8 Down	F9 Commnd	F10 Bottom	ESC Escape	NUMLOCK is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	3600.000	1080000.00	1
2	12000.000	400000.00	1
3			

Member Section Properties

Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
4	3.000	P	1	1	21000.000
5	3.000	P	1	1	21000.000
6	7.000	P	1	2	21000.000
7	3.000	P	1	1	21000.000
8	3.000	P	1	1	21000.000
9	5.000	P	1	2	21000.000
10	3.000	P	1	1	21000.000
11	3.000	P<	1	1	21000.000

Input mode

F1 Help	F2 Calc	F6 Top	F7 Up	F8 Down	F9 Commnd	F10 Bottom	ESC Escape	NUMLOCK is ON

Supports

No.	Jnt Pos	X Restraint (kN/mm)	Y Restraint (kN/mm)	A Restraint (kNm/rad)
1	1<	FULL	FULL	FULL
2	3	FULL	FULL	FULL
3	4	FULL	FULL	FULL
4	6	FULL	FULL	FULL
5	7	FULL	FULL	FULL
6	9	FULL	FULL	FULL
7	10	FULL	FULL	FULL
8	12	FULL	FULL	FULL
9				

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Global load case names

No.	Load Case Name
1	Dead Load<
2	LIVE LOAD 1
3	LIVE LOAD 2
4	LIVE LOAD 3
5	

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

MEMBER LOADS   Loads & moments on Member 3 (length = 5.000m slope = 0.000deg)

Mem No.	No.of Loads	Ld. No.	Load case Number & name	Load Type	Start Pos(m)	Loaded Len(m)	(kN, kN.m or kN/m) Start val.	End val.
1	0	1	1 Dead Load	UV			40.000	
2	0	2	2 LIVE LOAD 1	UV			35.000	
3	2	3						
4	0							
5	0							
6	2							
7	0							
8	0							
9	2							
10	0							
11	0							

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

```
MEMBER LOADS   Loads & moments on Member 6  (length = 7.000m slope = 0.000deg)
Mem   No.of    Ld.  Load case           Load  Start Loaded  ( kN, kN.m or kN/m )
No.   Loads    No.  Number & name       Type Pos(m) Len(m) Start val.   End val.
 1      0       1   1       Dead Load UV                      40.000
 2      0       2   3     LIVE LOAD 2 UV                      35.000
 3      2       3
 4      0
 5      0
 6      2
 7      0
 8      0
 9      2
10      0
11      0


              Input mode


  F1     F2            F6     F7     F8     F9      F10    ESC          NUMLOCK
 Help   Calc           Top    Up    Down  Commnd Bottom Escape           is ON
```

```
MEMBER LOADS   Loads & moments on Member 9  (length = 5.000m slope = 0.000deg)
Mem   No.of    Ld.  Load case           Load  Start Loaded  ( kN, kN.m or kN/m )
No.   Loads    No.  Number & name       Type Pos(m) Len(m) Start val.   End val.
 1      0       1   1<      Dead Load UV                      40.000
 2      0       2   4     LIVE LOAD 3 UV                      35.000
 3      2       3
 4      0
 5      0
 6      2
 7      0
 8      0
 9      2
10      0
11      0


              Input mode


  F1     F2            F6     F7     F8     F9      F10    ESC          NUMLOCK
 Help   Calc           Top    Up    Down  Commnd Bottom Escape           is ON
```

```
Safety Factors for Combination  1
Load Case                Safety
Number and name          factor
 1          Dead Load     1.000
 2        LIVE LOAD 1     1.000
 3        LIVE LOAD 2     0.000
 4        LIVE LOAD 3     0.000
```

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Safety Factors for Combination 2

Load Case Number and name		Safety factor
1	Dead Load	1.000
2	LIVE LOAD 1	0.000
3	LIVE LOAD 2	1.000
4	LIVE LOAD 3	0.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Safety Factors for Combination 3

Load Case Number and name		Safety factor
1	Dead Load	1.000
2	LIVE LOAD 1	1.000
3	LIVE LOAD 2	1.000
4	LIVE LOAD 3	0.000

```
Input mode

  F1     F2                F6     F7     F8     F9     F10    ESC           NUMLOCK
 Help   Calc              Top    Up     Down  Commnd Bottom Escape          is ON

Safety Factors for Combination  4
Load Case                Safety
Number and name          factor
  1        Dead Load      1.000<
  2      LIVE LOAD 1      1.000
  3 .    LIVE LOAD 2      1.000
  4      LIVE LOAD 3      1.000
```

```
Input mode

  F1     F2                F6     F7     F8     F9     F10    ESC           NUMLOCK
 Help   Calc              Top    Up     Down  Commnd Bottom Escape          is ON

Safety Factors for Combination  5
Load Case                Safety
Number and name          factor
  1        Dead Load      1.000
  2      LIVE LOAD 1      1.000
  3      LIVE LOAD 2      0.000
  4      LIVE LOAD 3      1.000
```

```
Input mode

  F1     F2                F6     F7     F8     F9     F10    ESC           NUMLOCK
```

FRAME GEOMETRY

No. of Joints = 12

MEMBERS

Mem No.	End 1 Jt. no.	C	X coord (m)	Y coord (m)	End 2 Jt. no.	C	X Coord (m)	Y Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	0.000	3.000	3.000	90.00
2	2	F	0.000	3.000	3	F	0.000	6.000	3.000	90.00
3	2	F	0.000	3.000	5	F	5.000	3.000	5.000	0.00
4	4	F	5.000	0.000	5	F	5.000	3.000	3.000	90.00
5	5	F	5.000	3.000	6	F	5.000	6.000	3.000	90.00
6	5	F	5.000	3.000	8	F	12.000	3.000	7.000	0.00
7	7	F	12.000	0.000	8	F	12.000	3.000	3.000	90.00
8	8	F	12.000	3.000	9	F	12.000	6.000	3.000	90.00
9	8	F	12.000	3.000	11	F	17.000	3.000	5.000	0.00
10	10	F	17.000	0.000	11	F	17.000	3.000	3.000	90.00
11	11	F	17.000	3.000	12	F	17.000	6.000	3.000	90.00

TABLE OF SECTIONS

Section Number	Area (cm2)	Inertia (cm4)	Rectangular Elements (if specified) No	D (mm)	B (mm)	Y (mm)
1	3600.00	1080000.0	1	600.00	600.00	0.00
2	12000.00	400000.0	1	200.00	6000.00	0.00

SUMMARY OF MEMBER PROPERTIES

Member 1 - 2 PRISMATIC : Section Number 1 : Modulus E = 21000.0 N/mm2

Member 3 PRISMATIC : Section Number 2 : Modulus E = 21000.0 N/mm2

Member 4 - 5 PRISMATIC : Section Number 1 : Modulus E = 21000.0 N/mm2

Member 6 PRISMATIC : Section Number 2 : Modulus E = 21000.0 N/mm2

Member 7 - 8 PRISMATIC : Section Number 1 : Modulus E = 21000.0 N/mm2

Member 9 PRISMATIC : Section Number 2 : Modulus E = 21000.0 N/mm2

Member 10 - 11 PRISMATIC : Section Number 1 : Modulus E = 21000.0 N/mm2

SUPPORTS

No. of Supports = 8

```
  Joint : X Restraint : Y Restraint : Angular Restraint
 Number :   ( kN/mm ) :   ( kN/mm ) :   ( kN.m/radian )
--------:-------------:-------------:-------------------
```


```
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SUPPORTS continued

  Joint : X Restraint : Y Restraint : Angular Restraint
 Number :   ( kN/mm ) :   ( kN/mm ) :   ( kN.m/radian )
--------:-------------:-------------:-------------------
    1   :    FULL     :    FULL     :      FULL
    3   :    FULL     :    FULL     :      FULL
    4   :    FULL     :    FULL     :      FULL
    6   :    FULL     :    FULL     :      FULL
    7   :    FULL     :    FULL     :      FULL
    9   :    FULL     :    FULL     :      FULL
   10   :    FULL     :    FULL     :      FULL
   12   :    FULL     :    FULL     :      FULL
==============================================================================
APPLIED LOADS AND MOMENTS

MEMBER 3

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:   Length:   Start Value:        End Value
---:-----------------:----:----------:----------:-----------------:-------------
  1:        Dead Load: UV :           :         :   40.000 kN/m:
  2:      LIVE LOAD 1: UV :           :         :   35.000 kN/m:
--------------------------------------------------------------------------------
MEMBER 6

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:   Length:   Start Value:        End Value
---:-----------------:----:----------:----------:-----------------:-------------
  1:        Dead Load: UV :           :         :   40.000 kN/m:
  3:      LIVE LOAD 2: UV :           :         :   35.000 kN/m:
--------------------------------------------------------------------------------
MEMBER 9

L O A D   C A S E    :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name            :Type:     Start:   Length:   Start Value:        End Value
---:-----------------:----:----------:----------:-----------------:-------------
  1:        Dead Load: UV :           :         :   40.000 kN/m:
  4:      LIVE LOAD 3: UV :           :         :   35.000 kN/m:
================================================================================
COMBINATIONS

                     : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E    : Combination Number
```

```
No : Name              : 1  : 2  : 3  : 4  : 5
-------------------:-----:-----:-----:-----:-----
  1:        Dead Load:1.000:1.000:1.000:1.000:1.000
  2:      LIVE LOAD 1:1.000:     :1.000:1.000:1.000
  3:      LIVE LOAD 2:     :1.000:1.000:1.000:
  4:      LIVE LOAD 3:     :     :     :1.000:1.000
==============================================================================
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==============================================================================
*                            * EGYPTIAN ENGINEERS            * JOB : FRAME
*----------------------------*-------------------------------*----------------
*                            *  FOR COMPUTERS ( E  E  C )    * DATE: 1992
*                            * 190 EL_SUDAN ST.,MOHANDESSIN  *----------------
*                            * A N A L Y S I S  R E S U L T S *SHEET:      7
*-----------------------------------------------------------------------------
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RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0000	35.268	91.488	-35.268
2	0.00	-0.04	-0.0002			
3	0.00	0.00	0.0000	-35.268	91.488	-35.268
4	0.00	0.00	0.0000	0.467	166.519	-0.467
5	0.00	-0.07	0.0000			
6	0.00	0.00	0.0000	-0.467	166.519	-0.467
7	0.00	0.00	0.0000	-16.134	121.656	16.134
8	0.00	-0.05	0.0001			
9	0.00	0.00	0.0000	16.134	121.656	16.134
10	0.00	0.00	0.0000	-18.076	47.837	18.076
11	0.00	-0.02	0.0001			
12	0.00	0.00	0.0000	18.076	47.837	18.076

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-855.000	-6217.500
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-855.000	-6217.500
Summation	0.000	855.000	6217.500
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 2

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0000	16.608	45.925	-16.608
2	0.00	-0.02	-0.0001			
3	0.00	0.00	0.0000	-16.608	45.925	-16.608
4	0.00	0.00	0.0000	47.867	185.325	-47.867

5	0.00	-0.07	-0.0003			
6	0.00	0.00	0.0000	-47.867	185.325	-47.867
7	0.00	0.00	0.0000	-47.867	185.325	47.867
8	0.00	-0.07	0.0003			
9	0.00	0.00	0.0000	47.867	185.325	47.867
10	0.00	0.00	0.0000	-16.608	45.925	16.608
11	0.00	-0.02	0.0001			
12	0.00	0.00	0.0000	16.608	45.925	16.608

RESULTS FOR COMBINATION 2 continued

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-925.000	-7862.500
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-925.000	-7862.500
Summation	0.000	925.000	7862.500
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 3

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0000	33.823	89.606	-33.823
2	0.00	-0.04	-0.0002			
3	0.00	0.00	0.0000	-33.823	89.606	-33.823
4	0.00	0.00	0.0000	31.697	229.651	-31.697
5	0.00	-0.09	-0.0002			
6	0.00	0.00	0.0000	-31.697	229.651	-31.697
7	0.00	0.00	0.0000	-47.365	184.788	47.365
8	0.00	-0.07	0.0003			
9	0.00	0.00	0.0000	47.365	184.788	47.365
10	0.00	0.00	0.0000	-16.632	45.956	16.632
11	0.00	-0.02	0.0001			
12	0.00	0.00	0.0000	16.632	45.956	16.632

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-1100.000	-8300.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-1100.000	-8300.000
Summation	0.000	1100.000	8300.000
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 4

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0000	33.848	89.637	-33.848
2	0.00	-0.04	-0.0002			
3	0.00	0.00	0.0000	-33.848	89.637	-33.848
4	0.00	0.00	0.0000	31.195	229.113	-31.195
5	0.00	-0.09	-0.0002			
6	0.00	0.00	0.0000	-31.195	229.113	-31.195
7	0.00	0.00	0.0000	-31.195	229.113	31.195

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RESULTS FOR COMBINATION 4 continued

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
8	0.00	-0.09	0.0002			
9	0.00	0.00	0.0000	31.195	229.113	31.195
10	0.00	0.00	0.0000	-33.848	89.637	33.848
11	0.00	-0.04	0.0002			
12	0.00	0.00	0.0000	33.848	89.637	33.848

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-1275.000	-10837.500
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-1275.000	-10837.500
Summation	0.000	1275.000	10837.500
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 5

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	O(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0000	35.292	91.519	-35.292
2	0.00	-0.04	-0.0002			
3	0.00	0.00	0.0000	-35.292	91.519	-35.292
4	0.00	0.00	0.0000	-0.036	165.981	0.036
5	0.00	-0.07	0.0000			
6	0.00	0.00	0.0000	0.036	165.981	0.036
7	0.00	0.00	0.0000	0.036	165.981	-0.036
8	0.00	-0.07	0.0000			
9	0.00	0.00	0.0000	-0.036	165.981	-0.036
10	0.00	0.00	0.0000	-35.292	91.519	35.292
11	0.00	-0.04	0.0002			
12	0.00	0.00	0.0000	35.292	91.519	35.292

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-1030.000	-8755.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-1030.000	-8755.000
Summation	0.000	1030.000	8755.000
Summation	0.000	0.000	0.000

Maxima for Member 1

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-35.268	91.488	0.000	35.268	0.000	-70.536	3.000
2	-16.608	45.925	0.000	16.608	0.000	-33.215	3.000
3	-33.823	89.606	0.000	33.823	0.000	-67.647	3.000
4	-33.848	89.637	0.000	33.848	0.000	-67.695	3.000
5	-35.292	91.519	0.000	35.292	0.000	-70.584	3.000

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-35.268	0.000	91.488	70.536	0.000	-35.268	3.000
2	-16.608	0.000	45.925	33.215	0.000	-16.608	3.000
3	-33.823	0.000	89.606	67.647	0.000	-33.823	3.000
4	-33.848	0.000	89.637	67.695	0.000	-33.848	3.000
5	-35.292	0.000	91.519	70.584	0.000	-35.292	3.000

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-192.025	0.000	0.000	82.128	2.440	-163.695	5.000
2	-108.151	0.000	0.000	39.024	2.296	-107.183	5.000
3	-195.788	0.000	0.000	78.819	2.389	-176.734	5.000
4	-195.726	0.000	0.000	78.871	2.390	-176.520	5.000
5	-191.963	0.000	0.000	82.183	2.440	-163.481	5.000

Maxima for Member 4

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-0.467	166.519	0.000	0.467	0.000	-0.934	3.000
2	-47.867	185.325	0.000	47.867	0.000	-95.734	3.000
3	-31.697	229.651	0.000	31.697	0.000	-63.394	3.000
4	-31.195	229.113	0.000	31.195	0.000	-62.389	3.000
5	0.036	165.981	0.000	0.071	3.000	-0.036	0.000

Maxima for Member 5

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-0.467	0.000	166.519	0.934	0.000	-0.467	3.000
2	-47.867	0.000	185.325	95.734	0.000	-47.867	3.000
3	-31.697	0.000	229.651	63.394	0.000	-31.697	3.000
4	-31.195	0.000	229.113	62.389	0.000	-31.195	3.000
5	0.036	0.000	165.981	0.036	3.000	-0.071	0.000

Maxima for Member 6

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	141.013	0.000	0.000	82.997	3.525	-165.563	0.000
2	262.500	0.000	0.000	160.723	3.500	-298.652	0.000
3	263.513	0.000	0.000	159.407	3.514	-303.522	0.000
4	262.500	0.000	0.000	158.077	3.500	-301.298	0.000
5	-140.000	0.000	0.000	81.661	3.500	-163.339	0.000

Maxima for Member 7

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)

1	16.134	121.656	0.000	32.269	3.000	-16.134	0.000
2	47.867	185.325	0.000	95.734	3.000	-47.867	0.000
3	47.365	184.788	0.000	94.729	3.000	-47.365	0.000
4	31.195	229.113	0.000	62.389	3.000	-31.195	0.000
5	-0.036	165.981	0.000	0.036	0.000	-0.071	3.000

Maxima for Member 8

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	16.134	0.000	121.656	16.134	3.000	-32.269	0.000
2	47.867	0.000	185.325	47.867	3.000	-95.734	0.000
3	47.365	0.000	184.788	47.365	3.000	-94.729	0.000
4	31.195	0.000	229.113	31.195	3.000	-62.389	0.000
5	-0.036	0.000	165.981	0.071	0.000	-0.036	3.000

Maxima for Member 9

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	104.325	0.000	0.000	42.116	2.608	-93.931	0.000
2	108.151	0.000	0.000	39.024	2.704	-107.183	0.000
3	108.089	0.000	0.000	39.070	2.702	-106.970	0.000
4	195.726	0.000	0.000	78.871	2.610	-176.520	0.000
5	191.963	0.000	0.000	82.183	2.560	-163.481	0.000

Maxima for Member 10

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	18.076	47.837	0.000	36.152	3.000	-18.076	0.000
2	16.608	45.925	0.000	33.215	3.000	-16.608	0.000
3	16.632	45.956	0.000	33.263	3.000	-16.632	0.000
4	33.848	89.637	0.000	67.695	3.000	-33.848	0.000
5	35.292	91.519	0.000	70.584	3.000	-35.292	0.000

Maxima for Member 11

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	18.076	0.000	47.837	18.076	3.000	-36.152	0.000
2	16.608	0.000	45.925	16.608	3.000	-33.215	0.000
3	16.632	0.000	45.956	16.632	3.000	-33.263	0.000
4	33.848	0.000	89.637	33.848	3.000	-67.695	0.000

5	35.292	0.000	91.519	35.292	3.000	-70.584	0.000

RESULTS FOR COMBINATION 1 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	3.000	-35.268	91.488	-70.536	0.0	0.0	89.987
0.75L	2.250	-35.268	91.488	-44.085	-0.1	0.0	89.997
0.50L	1.500	-35.268	91.488	-17.634	-0.1	0.0	90.003
0.25L	0.750	-35.268	91.488	8.817	0.0	0.0	90.004
Jt. 1	0.000	-35.268	91.488	35.268	0.0	0.0	90.000

Maximum +ve Bending Moment 35.268 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -70.536 kN.m at 3.000m from joint 1

RESULTS FOR COMBINATION 1 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	3.000	-35.268	-91.488	-35.268	0.0	0.0	90.000
0.75L	2.250	-35.268	-91.488	-8.817	0.0	0.0	90.004
0.50L	1.500	-35.268	-91.488	17.634	0.1	0.0	90.003
0.25L	0.750	-35.268	-91.488	44.085	0.1	0.0	89.997
Jt. 2	0.000	-35.268	-91.488	70.536	0.0	0.0	89.987

Maximum +ve Bending Moment 70.536 kN.m at 0.000m from joint 2
Maximum -ve Bending Moment -35.268 kN.m at 3.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	5.000	-192.025	0.000	-163.695	0.0	-0.1	0.000
0.75L	3.750	-98.275	0.000	17.742	0.0	-0.9	0.054
0.50L	2.500	-4.525	0.000	81.992	0.0	-1.6	0.003
0.25L	1.250	89.225	0.000	29.054	0.0	-1.0	-0.053
Jt. 2	0.000	182.975	0.000	-141.072	0.0	0.0	-0.013

Maximum +ve Bending Moment 82.128 kN.m at 2.440m from joint 2
Maximum -ve Bending Moment -163.695 kN.m at 5.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	3.000	-0.467	166.519	-0.934	0.0	-0.1	90.000
0.75L	2.250	-0.467	166.519	-0.584	0.0	0.0	90.000
0.50L	1.500	-0.467	166.519	-0.234	0.0	0.0	90.000
0.25L	0.750	-0.467	166.519	0.117	0.0	0.0	90.000
Jt. 4	0.000	-0.467	166.519	0.467	0.0	0.0	90.000

Maximum +ve Bending Moment 0.467 kN.m at 0.000m from joint 4
Maximum -ve Bending Moment -0.934 kN.m at 3.000m from joint 4

RESULTS FOR COMBINATION 1 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	-0.467	-166.519	-0.467	0.0	0.0	90.000
0.75L	2.250	-0.467	-166.519	-0.117	0.0	0.0	90.000
0.50L	1.500	-0.467	-166.519	0.234	0.0	0.0	90.000
0.25L	0.750	-0.467	-166.519	0.584	0.0	0.0	90.000
Jt. 5	0.000	-0.467	-166.519	0.934	0.0	-0.1	90.000

Maximum +ve Bending Moment 0.934 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment -0.467 kN.m at 3.000m from joint 5

RESULTS FOR COMBINATION 1 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	7.000	-138.987	0.000	-158.469	0.0	0.0	0.006
0.75L	5.250	-68.987	0.000	23.508	0.0	-1.8	0.074
0.50L	3.500	1.013	0.000	82.984	0.0	-3.1	-0.001
0.25L	1.750	71.013	0.000	19.961	0.0	-1.8	-0.075
Jt. 5	0.000	141.013	0.000	-165.563	0.0	-0.1	0.000

Maximum +ve Bending Moment 82.997 kN.m at 3.525m from joint 5
Maximum -ve Bending Moment -165.563 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 1 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	16.134	121.656	32.269	0.0	0.0	90.006
0.75L	2.250	16.134	121.656	20.168	0.0	0.0	90.001
0.50L	1.500	16.134	121.656	8.067	0.0	0.0	89.998
0.25L	0.750	16.134	121.656	-4.034	0.0	0.0	89.998
Jt. 7	0.000	16.134	121.656	-16.134	0.0	0.0	90.000

Maximum +ve Bending Moment 32.269 kN.m at 3.000m from joint 7
Maximum -ve Bending Moment -16.134 kN.m at 0.000m from joint 7

RESULTS FOR COMBINATION 1 MEMBER 8

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 9	3.000	16.134	-121.656	16.134	0.0	0.0	90.000
0.75L	2.250	16.134	-121.656	4.034	0.0	0.0	89.998
0.50L	1.500	16.134	-121.656	-8.067	0.0	0.0	89.998
0.25L	0.750	16.134	-121.656	-20.168	0.0	0.0	90.001
Jt. 8	0.000	16.134	-121.656	-32.269	0.0	0.0	90.006

Maximum +ve Bending Moment 16.134 kN.m at 3.000m from joint 8
Maximum -ve Bending Moment -32.269 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 1 MEMBER 9

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	5.000	-95.675	0.000	-72.305	0.0	0.0	0.007
0.75L	3.750	-45.675	0.000	16.039	0.0	-0.5	0.026
0.50L	2.500	4.325	0.000	41.882	0.0	-0.8	-0.003
0.25L	1.250	54.325	0.000	5.226	0.0	-0.4	-0.027
Jt. 8	0.000	104.325	0.000	-93.931	0.0	0.0	0.006

Maximum +ve Bending Moment 42.116 kN.m at 2.608m from joint 8
Maximum -ve Bending Moment -93.931 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 1 MEMBER 10

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	3.000	18.076	47.837	36.152	0.0	0.0	90.007
0.75L	2.250	18.076	47.837	22.595	0.1	0.0	90.001
0.50L	1.500	18.076	47.837	9.038	0.0	0.0	89.998
0.25L	0.750	18.076	47.837	-4.519	0.0	0.0	89.998
Jt. 10	0.000	18.076	47.837	-18.076	0.0	0.0	90.000

Maximum +ve Bending Moment 36.152 kN.m at 3.000m from joint 10
Maximum -ve Bending Moment -18.076 kN.m at 0.000m from joint 10

RESULTS FOR COMBINATION 1 MEMBER 11

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	18.076	-47.837	18.076	0.0	0.0	90.000
0.75L	2.250	18.076	-47.837	4.519	0.0	0.0	89.998
0.50L	1.500	18.076	-47.837	-9.038	0.0	0.0	89.998
0.25L	0.750	18.076	-47.837	-22.595	-0.1	0.0	90.001
Jt. 11	0.000	18.076	-47.837	-36.152	0.0	0.0	90.007

Maximum +ve Bending Moment 18.076 kN.m at 3.000m from joint 11
Maximum -ve Bending Moment -36.152 kN.m at 0.000m from joint 11

RESULTS FOR COMBINATION 2 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	3.000	-16.608	45.925	-33.215	0.0	0.0	89.994
0.75L	2.250	-16.608	45.925	-20.759	0.0	0.0	89.999
0.50L	1.500	-16.608	45.925	-8.304	0.0	0.0	90.002
0.25L	0.750	-16.608	45.925	4.152	0.0	0.0	90.002
Jt. 1	0.000	-16.608	45.925	16.608	0.0	0.0	90.000

Maximum +ve Bending Moment 16.608 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -33.215 kN.m at 3.000m from joint 1

RESULTS FOR COMBINATION 2 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	3.000	-16.608	-45.925	-16.608	0.0	0.0	90.000
0.75L	2.250	-16.608	-45.925	-4.152	0.0	0.0	90.002
0.50L	1.500	-16.608	-45.925	8.304	0.0	0.0	90.002
0.25L	0.750	-16.608	-45.925	20.759	0.0	0.0	89.999
Jt. 2	0.000	-16.608	-45.925	33.215	0.0	0.0	89.994

Maximum +ve Bending Moment 33.215 kN.m at 0.000m from joint 2
Maximum -ve Bending Moment -16.608 kN.m at 3.000m from joint 2

RESULTS FOR COMBINATION 2 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	5.000	-108.151	0.000	-107.183	0.0	-0.1	-0.018
0.75L	3.750	-58.151	0.000	-3.245	0.0	-0.3	0.024
0.50L	2.500	-8.151	0.000	38.193	0.0	-0.7	0.005
0.25L	1.250	41.849	0.000	17.132	0.0	-0.5	-0.023
Jt. 2	0.000	91.849	0.000	-66.430	0.0	0.0	-0.006

Maximum +ve Bending Moment 39.024 kN.m at 2.296m from joint 2
Maximum -ve Bending Moment -107.183 kN.m at 5.000m from joint 2

RESULTS FOR COMBINATION 2 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	3.000	-47.867	185.325	-95.734	0.0	-0.1	89.982
0.75L	2.250	-47.867	185.325	-59.834	-0.1	-0.1	89.997
0.50L	1.500	-47.867	185.325	-23.934	-0.1	0.0	90.005
0.25L	0.750	-47.867	185.325	11.967	0.0	0.0	90.006
Jt. 4	0.000	-47.867	185.325	47.867	0.0	0.0	90.000

Maximum +ve Bending Moment 47.867 kN.m at 0.000m from joint 4

Maximum -ve Bending Moment -95.734 kN.m at 3.000m from joint 4

RESULTS FOR COMBINATION 2 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	-47.867	-185.325	-47.867	0.0	0.0	90.000
0.75L	2.250	-47.867	-185.325	-11.967	0.0	0.0	90.006
0.50L	1.500	-47.867	-185.325	23.934	0.1	0.0	90.005
0.25L	0.750	-47.867	-185.325	59.834	0.1	-0.1	89.997
Jt. 5	0.000	-47.867	-185.325	95.734	0.0	-0.1	89.982

Maximum +ve Bending Moment 95.734 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment -47.867 kN.m at 3.000m from joint 5

RESULTS FOR COMBINATION 2 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	7.000	-262.500	0.000	-298.652	0.0	-0.1	0.018
0.75L	5.250	-131.250	0.000	45.879	0.0	-3.6	0.146
0.50L	3.500	0.000	0.000	160.723	0.0	-6.2	0.000
0.25L	1.750	131.250	0.000	45.879	0.0	-3.6	-0.146
Jt. 5	0.000	262.500	0.000	-298.652	0.0	-0.1	-0.018

Maximum +ve Bending Moment 160.723 kN.m at 3.500m from joint 5
Maximum -ve Bending Moment -298.652 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 2 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	47.867	185.325	95.734	0.0	-0.1	90.018
0.75L	2.250	47.867	185.325	59.834	0.1	-0.1	90.003
0.50L	1.500	47.867	185.325	23.934	0.1	0.0	89.995
0.25L	0.750	47.867	185.325	-11.967	0.0	0.0	89.994
Jt. 7	0.000	47.867	185.325	-47.867	0.0	0.0	90.000

Maximum +ve Bending Moment 95.734 kN.m at 3.000m from joint 7
Maximum -ve Bending Moment -47.867 kN.m at 0.000m from joint 7

RESULTS FOR COMBINATION 2 MEMBER 8

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 9	3.000	47.867	-185.325	47.867	0.0	0.0	90.000

0.75L	2.250	47.867	-185.325	11.967	0.0	0.0	89.994
0.50L	1.500	47.867	-185.325	-23.934	-0.1	0.0	89.995
0.25L	0.750	47.867	-185.325	-59.834	-0.1	-0.1	90.003
Jt. 8	0.000	47.867	-185.325	-95.734	0.0	-0.1	90.018

Maximum +ve Bending Moment 47.867 kN.m at 3.000m from joint 8
Maximum -ve Bending Moment -95.734 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 2 MEMBER 9

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	5.000	-91.849	0.000	-66.430	0.0	0.0	0.006
0.75L	3.750	-41.849	0.000	17.132	0.0	-0.5	0.023
0.50L	2.500	8.151	0.000	38.193	0.0	-0.7	-0.005
0.25L	1.250	58.151	0.000	-3.245	0.0	-0.3	-0.024
Jt. 8	0.000	108.151	0.000	-107.183	0.0	-0.1	0.018

Maximum +ve Bending Moment 39.024 kN.m at 2.704m from joint 8
Maximum -ve Bending Moment -107.183 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 2 MEMBER 10

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	3.000	16.608	45.925	33.215	0.0	0.0	90.006
0.75L	2.250	16.608	45.925	20.759	0.0	0.0	90.001
0.50L	1.500	16.608	45.925	8.304	0.0	0.0	89.998
0.25L	0.750	16.608	45.925	-4.152	0.0	0.0	89.998
Jt. 10	0.000	16.608	45.925	-16.608	0.0	0.0	90.000

Maximum +ve Bending Moment 33.215 kN.m at 3.000m from joint 10
Maximum -ve Bending Moment -16.608 kN.m at 0.000m from joint 10

RESULTS FOR COMBINATION 2 MEMBER 11

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	16.608	-45.925	16.608	0.0	0.0	90.000
0.75L	2.250	16.608	-45.925	4.152	0.0	0.0	89.998
0.50L	1.500	16.608	-45.925	-8.304	0.0	0.0	89.998
0.25L	0.750	16.608	-45.925	-20.759	0.0	0.0	90.001
Jt. 11	0.000	16.608	-45.925	-33.215	0.0	0.0	90.006

Maximum +ve Bending Moment 16.608 kN.m at 3.000m from joint 11
Maximum -ve Bending Moment -33.215 kN.m at 0.000m from joint 11

RESULTS FOR COMBINATION 3 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	3.000	-33.823	89.606	-67.647	0.0	0.0	89.987
0.75L	2.250	-33.823	89.606	-42.279	-0.1	0.0	89.998
0.50L	1.500	-33.823	89.606	-16.912	-0.1	0.0	90.003
0.25L	0.750	-33.823	89.606	8.456	0.0	0.0	90.004
Jt. 1	0.000	-33.823	89.606	33.823	0.0	0.0	90.000

Maximum +ve Bending Moment 33.823 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -67.647 kN.m at 3.000m from joint 1

RESULTS FOR COMBINATION 3 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	3.000	-33.823	-89.606	-33.823	0.0	0.0	90.000
0.75L	2.250	-33.823	-89.606	-8.456	0.0	0.0	90.004
0.50L	1.500	-33.823	-89.606	16.912	0.1	0.0	90.003
0.25L	0.750	-33.823	-89.606	42.279	0.1	0.0	89.998
Jt. 2	0.000	-33.823	-89.606	67.647	0.0	0.0	89.987

Maximum +ve Bending Moment 67.647 kN.m at 0.000m from joint 2
Maximum -ve Bending Moment -33.823 kN.m at 3.000m from joint 2

RESULTS FOR COMBINATION 3 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	5.000	-195.788	0.000	-176.734	0.0	-0.1	-0.012
0.75L	3.750	-102.038	0.000	9.408	0.0	-0.8	0.051
0.50L	2.500	-8.288	0.000	78.361	0.0	-1.5	0.005
0.25L	1.250	85.462	0.000	30.127	0.0	-1.0	-0.049
Jt. 2	0.000	179.212	0.000	-135.294	0.0	0.0	-0.013

Maximum +ve Bending Moment 78.819 kN.m at 2.389m from joint 2
Maximum -ve Bending Moment -176.734 kN.m at 5.000m from joint 2

RESULTS FOR COMBINATION 3 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	3.000	-31.697	229.651	-63.394	0.0	-0.1	89.988
0.75L	2.250	-31.697	229.651	-39.622	-0.1	-0.1	89.998

0.50L	1.500	-31.697	229.651	-15.849	-0.1	0.0	90.003
0.25L	0.750	-31.697	229.651	7.924	0.0	0.0	90.004
Jt. 4	0.000	-31.697	229.651	31.697	0.0	0.0	90.000

Maximum +ve Bending Moment 31.697 kN.m at 0.000m from joint 4
Maximum -ve Bending Moment -63.394 kN.m at 3.000m from joint 4

RESULTS FOR COMBINATION 3 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	-31.697	-229.651	-31.697	0.0	0.0	90.000
0.75L	2.250	-31.697	-229.651	-7.924	0.0	0.0	90.004
0.50L	1.500	-31.697	-229.651	15.849	0.1	0.0	90.003
0.25L	0.750	-31.697	-229.651	39.622	0.1	-0.1	89.998
Jt. 5	0.000	-31.697	-229.651	63.394	0.0	-0.1	89.988

Maximum +ve Bending Moment 63.394 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment -31.697 kN.m at 3.000m from joint 5

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RESULTS FOR COMBINATION 3 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	7.000	-261.487	0.000	-296.428	0.0	-0.1	0.018
0.75L	5.250	-130.237	0.000	46.330	0.0	-3.6	0.144
0.50L	3.500	1.013	0.000	159.400	0.0	-6.1	-0.001
0.25L	1.750	132.263	0.000	42.782	0.0	-3.5	-0.145
Jt. 5	0.000	263.513	0.000	-303.522	0.0	-0.1	-0.012

Maximum +ve Bending Moment 159.407 kN.m at 3.514m from joint 5
Maximum -ve Bending Moment -303.522 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 3 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	47.365	184.788	94.729	0.0	-0.1	90.018
0.75L	2.250	47.365	184.788	59.206	0.1	-0.1	90.003
0.50L	1.500	47.365	184.788	23.682	0.1	0.0	89.996
0.25L	0.750	47.365	184.788	-11.841	0.0	0.0	89.994
Jt. 7	0.000	47.365	184.788	-47.365	0.0	0.0	90.000

Maximum +ve Bending Moment 94.729 kN.m at 3.000m from joint 7
Maximum -ve Bending Moment -47.365 kN.m at 0.000m from joint 7

RESULTS FOR COMBINATION 3 MEMBER 8

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 9	3.000	47.365	-184.788	47.365	0.0	0.0	90.000
0.75L	2.250	47.365	-184.788	11.841	0.0	0.0	89.994
0.50L	1.500	47.365	-184.788	-23.682	-0.1	0.0	89.996
0.25L	0.750	47.365	-184.788	-59.206	-0.1	-0.1	90.003
Jt. 8	0.000	47.365	-184.788	-94.729	0.0	-0.1	90.018

Maximum +ve Bending Moment 47.365 kN.m at 3.000m from joint 8
Maximum -ve Bending Moment -94.729 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 3 MEMBER 9

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	5.000	-91.911	0.000	-66.527	0.0	0.0	0.006
0.75L	3.750	-41.911	0.000	17.113	0.0	-0.5	0.023
0.50L	2.500	8.089	0.000	38.252	0.0	-0.7	-0.005
0.25L	1.250	58.089	0.000	-3.109	0.0	-0.3	-0.025
Jt. 8	0.000	108.089	0.000	-106.970	0.0	-0.1	0.018

Maximum +ve Bending Moment 39.070 kN.m at 2.702m from joint 8
Maximum -ve Bending Moment -106.970 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 3 MEMBER 10

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	3.000	16.632	45.956	33.263	0.0	0.0	90.006
0.75L	2.250	16.632	45.956	20.790	0.0	0.0	90.001
0.50L	1.500	16.632	45.956	8.316	0.0	0.0	89.998
0.25L	0.750	16.632	45.956	-4.158	0.0	0.0	89.998
Jt. 10	0.000	16.632	45.956	-16.632	0.0	0.0	90.000

Maximum +ve Bending Moment 33.263 kN.m at 3.000m from joint 10
Maximum -ve Bending Moment -16.632 kN.m at 0.000m from joint 10

RESULTS FOR COMBINATION 3 MEMBER 11

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	16.632	-45.956	16.632	0.0	0.0	90.000
0.75L	2.250	16.632	-45.956	4.158	0.0	0.0	89.998
0.50L	1.500	16.632	-45.956	-8.316	0.0	0.0	89.998

0.25L	0.750	16.632	-45.956	-20.790	0.0	0.0	90.001
Jt. 11	0.000	16.632	-45.956	-33.263	0.0	0.0	90.006

Maximum +ve Bending Moment 16.632 kN.m at 3.000m from joint 11
Maximum -ve Bending Moment -33.263 kN.m at 0.000m from joint 11

RESULTS FOR COMBINATION 4 MEMBER 1

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	3.000	-33.848	89.637	-67.695	0.0	0.0	89.987
0.75L	2.250	-33.848	89.637	-42.309	-0.1	0.0	89.998
0.50L	1.500	-33.848	89.637	-16.924	-0.1	0.0	90.003
0.25L	0.750	-33.848	89.637	8.462	0.0	0.0	90.004
Jt. 1	0.000	-33.848	89.637	33.848	0.0	0.0	90.000

Maximum +ve Bending Moment 33.848 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -67.695 kN.m at 3.000m from joint 1

RESULTS FOR COMBINATION 4 MEMBER 2

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	3.000	-33.848	-89.637	-33.848	0.0	0.0	90.000
0.75L	2.250	-33.848	-89.637	-8.462	0.0	0.0	90.004
0.50L	1.500	-33.848	-89.637	16.924	0.1	0.0	90.003
0.25L	0.750	-33.848	-89.637	42.309	0.1	0.0	89.998
Jt. 2	0.000	-33.848	-89.637	67.695	0.0	0.0	89.987

Maximum +ve Bending Moment 67.695 kN.m at 0.000m from joint 2
Maximum -ve Bending Moment -33.848 kN.m at 3.000m from joint 2

*	* EGYPTIAN ENGINEERS	* JOB : FRAME
*	* FOR COMPUTERS (E E C) * 190 EL_SUDAN ST., MOHANDESSIN * A N A L Y S I S R E S U L T S	* DATE: 1992 *SHEET: 21

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RESULTS FOR COMBINATION 4 MEMBER 3

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	5.000	-195.726	0.000	-176.520	0.0	-0.1	-0.012
0.75L	3.750	-101.976	0.000	9.544	0.0	-0.8	0.051
0.50L	2.500	-8.226	0.000	78.420	0.0	-1.5	0.005
0.25L	1.250	85.524	0.000	30.108	0.0	-1.0	-0.049
Jt. 2	0.000	179.274	0.000	-135.390	0.0	0.0	-0.013

Maximum +ve Bending Moment 78.871 kN.m at 2.390m from joint 2
Maximum -ve Bending Moment -176.520 kN.m at 5.000m from joint 2

RESULTS FOR COMBINATION 4 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	3.000	-31.195	229.113	-62.389	0.0	-0.1	89.988
0.75L	2.250	-31.195	229.113	-38.993	-0.1	-0.1	89.998
0.50L	1.500	-31.195	229.113	-15.597	-0.1	0.0	90.003
0.25L	0.750	-31.195	229.113	7.799	0.0	0.0	90.004
Jt. 4	0.000	-31.195	229.113	31.195	0.0	0.0	90.000

Maximum +ve Bending Moment 31.195 kN.m at 0.000m from joint 4
Maximum -ve Bending Moment -62.389 kN.m at 3.000m from joint 4

RESULTS FOR COMBINATION 4 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	-31.195	-229.113	-31.195	0.0	0.0	90.000
0.75L	2.250	-31.195	-229.113	-7.799	0.0	0.0	90.004
0.50L	1.500	-31.195	-229.113	15.597	0.1	0.0	90.003
0.25L	0.750	-31.195	-229.113	38.993	0.1	-0.1	89.998
Jt. 5	0.000	-31.195	-229.113	62.389	0.0	-0.1	89.988

Maximum +ve Bending Moment 62.389 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment -31.195 kN.m at 3.000m from joint 5

RESULTS FOR COMBINATION 4 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	7.000	-262.500	0.000	-301.298	0.0	-0.1	0.012
0.75L	5.250	-131.250	0.000	43.233	0.0	-3.5	0.143
0.50L	3.500	0.000	0.000	158.077	0.0	-6.0	0.000
0.25L	1.750	131.250	0.000	43.233	0.0	-3.5	-0.143
Jt. 5	0.000	262.500	0.000	-301.298	0.0	-0.1	-0.012

Maximum +ve Bending Moment 158.077 kN.m at 3.500m from joint 5
Maximum -ve Bending Moment -301.298 kN.m at 0.000m from joint 5

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*	* EGYPTIAN ENGINEERS	* JOB : FRAME
*	* FOR COMPUTERS (E E C)	* DATE: 1992
*	* 190 EL_SUDAN ST.,MOHANDESSIN	
*	* A N A L Y S I S R E S U L T S	*SHEET: 22

RESULTS FOR COMBINATION 4 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	31.195	229.113	62.389	0.0	-0.1	90.012
0.75L	2.250	31.195	229.113	38.993	0.1	-0.1	90.002
0.50L	1.500	31.195	229.113	15.597	0.1	0.0	89.997
0.25L	0.750	31.195	229.113	-7.799	0.0	0.0	89.996

Jt. 7	0.000	31.195	229.113	-31.195	0.0	0.0	90.000

Maximum +ve Bending Moment 62.389 kN.m at 3.000m from joint 7
Maximum -ve Bending Moment -31.195 kN.m at 0.000m from joint 7

RESULTS FOR COMBINATION 4 MEMBER 8

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 9	3.000	31.195	-229.113	31.195	0.0	0.0	90.000
0.75L	2.250	31.195	-229.113	7.799	0.0	0.0	89.996
0.50L	1.500	31.195	-229.113	-15.597	-0.1	0.0	89.997
0.25L	0.750	31.195	-229.113	-38.993	-0.1	-0.1	90.002
Jt. 8	0.000	31.195	-229.113	-62.389	0.0	-0.1	90.012

Maximum +ve Bending Moment 31.195 kN.m at 3.000m from joint 8
Maximum -ve Bending Moment -62.389 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 4 MEMBER 9

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	5.000	-179.274	0.000	-135.390	0.0	0.0	0.013
0.75L	3.750	-85.524	0.000	30.108	0.0	-1.0	0.049
0.50L	2.500	8.226	0.000	78.420	0.0	-1.5	-0.005
0.25L	1.250	101.976	0.000	9.544	0.0	-0.8	-0.051
Jt. 8	0.000	195.726	0.000	-176.520	0.0	-0.1	0.012

Maximum +ve Bending Moment 78.871 kN.m at 2.610m from joint 8
Maximum -ve Bending Moment -176.520 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 4 MEMBER 10

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	3.000	33.848	89.637	67.695	0.0	0.0	90.013
0.75L	2.250	33.848	89.637	42.309	0.1	0.0	90.002
0.50L	1.500	33.848	89.637	16.924	0.1	0.0	89.997
0.25L	0.750	33.848	89.637	-8.462	0.0	0.0	89.996
Jt. 10	0.000	33.848	89.637	-33.848	0.0	0.0	90.000

Maximum +ve Bending Moment 67.695 kN.m at 3.000m from joint 10
Maximum -ve Bending Moment -33.848 kN.m at 0.000m from joint 10

RESULTS FOR COMBINATION 4 MEMBER 11

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	33.848	-89.637	33.848	0.0	0.0	90.000
0.75L	2.250	33.848	-89.637	8.462	0.0	0.0	89.996
0.50L	1.500	33.848	-89.637	-16.924	-0.1	0.0	89.997
0.25L	0.750	33.848	-89.637	-42.309	-0.1	0.0	90.002
Jt. 11	0.000	33.848	-89.637	-67.695	0.0	0.0	90.013

Maximum +ve Bending Moment 33.848 kN.m at 3.000m from joint 11
Maximum -ve Bending Moment -67.695 kN.m at 0.000m from joint 11

RESULTS FOR COMBINATION 5 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	3.000	-35.292	91.519	-70.584	0.0	0.0	89.987
0.75L	2.250	-35.292	91.519	-44.115	-0.1	0.0	89.997
0.50L	1.500	-35.292	91.519	-17.646	-0.1	0.0	90.003
0.25L	0.750	-35.292	91.519	8.823	0.0	0.0	90.004
Jt. 1	0.000	-35.292	91.519	35.292	0.0	0.0	90.000

Maximum +ve Bending Moment 35.292 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -70.584 kN.m at 3.000m from joint 1

RESULTS FOR COMBINATION 5 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	3.000	-35.292	-91.519	-35.292	0.0	0.0	90.000
0.75L	2.250	-35.292	-91.519	-8.823	0.0	0.0	90.004
0.50L	1.500	-35.292	-91.519	17.646	0.1	0.0	90.003
0.25L	0.750	-35.292	-91.519	44.115	0.1	0.0	89.997
Jt. 2	0.000	-35.292	-91.519	70.584	0.0	0.0	89.987

Maximum +ve Bending Moment 70.584 kN.m at 0.000m from joint 2
Maximum -ve Bending Moment -35.292 kN.m at 3.000m from joint 2

RESULTS FOR COMBINATION 5 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	5.000	-191.963	0.000	-163.481	0.0	-0.1	0.000
0.75L	3.750	-98.213	0.000	17.878	0.0	-0.9	0.054
0.50L	2.500	-4.463	0.000	82.050	0.0	-1.7	0.003
0.25L	1.250	89.287	0.000	29.035	0.0	-1.0	-0.053
Jt. 2	0.000	183.037	0.000	-141.168	0.0	0.0	-0.013

Maximum +ve Bending Moment 82.183 kN.m at 2.440m from joint 2
Maximum -ve Bending Moment -163.481 kN.m at 5.000m from joint 2

RESULTS FOR COMBINATION 5 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	3.000	0.036	165.981	0.071	0.0	-0.1	90.000
0.75L	2.250	0.036	165.981	0.044	0.0	0.0	90.000
0.50L	1.500	0.036	165.981	0.018	0.0	0.0	90.000
0.25L	0.750	0.036	165.981	-0.009	0.0	0.0	90.000
Jt. 4	0.000	0.036	165.981	-0.036	0.0	0.0	90.000

Maximum +ve Bending Moment 0.071 kN.m at 3.000m from joint 4
Maximum -ve Bending Moment -0.036 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 5 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	0.036	-165.981	0.036	0.0	0.0	90.000
0.75L	2.250	0.036	-165.981	0.009	0.0	0.0	90.000
0.50L	1.500	0.036	-165.981	-0.018	0.0	0.0	90.000
0.25L	0.750	0.036	-165.981	-0.044	0.0	0.0	90.000
Jt. 5	0.000	0.036	-165.981	-0.071	0.0	-0.1	90.000

Maximum +ve Bending Moment 0.036 kN.m at 3.000m from joint 5
Maximum -ve Bending Moment -0.071 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 5 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	7.000	-140.000	0.000	-163.339	0.0	-0.1	0.000
0.75L	5.250	-70.000	0.000	20.411	0.0	-1.7	0.073
0.50L	3.500	0.000	0.000	81.661	0.0	-3.0	0.000
0.25L	1.750	70.000	0.000	20.411	0.0	-1.7	-0.073
Jt. 5	0.000	140.000	0.000	-163.339	0.0	-0.1	0.000

Maximum +ve Bending Moment 81.661 kN.m at 3.500m from joint 5
Maximum -ve Bending Moment -163.339 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 5 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	-0.036	165.981	-0.071	0.0	-0.1	90.000
0.75L	2.250	-0.036	165.981	-0.044	0.0	0.0	90.000
0.50L	1.500	-0.036	165.981	-0.018	0.0	0.0	90.000
0.25L	0.750	-0.036	165.981	0.009	0.0	0.0	90.000
Jt. 7	0.000	-0.036	165.981	0.036	0.0	0.0	90.000

Maximum +ve Bending Moment 0.036 kN.m at 0.000m from joint 7
Maximum -ve Bending Moment -0.071 kN.m at 3.000m from joint 7

RESULTS FOR COMBINATION 5 MEMBER 8

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 9	3.000	-0.036	-165.981	-0.036	0.0	0.0	90.000
0.75L	2.250	-0.036	-165.981	-0.009	0.0	0.0	90.000
0.50L	1.500	-0.036	-165.981	0.018	0.0	0.0	90.000
0.25L	0.750	-0.036	-165.981	0.044	0.0	0.0	90.000
Jt. 8	0.000	-0.036	-165.981	0.071	0.0	-0.1	90.000

Maximum +ve Bending Moment 0.071 kN.m at 0.000m from joint 8
Maximum -ve Bending Moment -0.036 kN.m at 3.000m from joint 8

RESULTS FOR COMBINATION 5 MEMBER 9

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	5.000	-183.037	0.000	-141.168	0.0	0.0	0.013
0.75L	3.750	-89.287	0.000	29.035	0.0	-1.0	0.053
0.50L	2.500	4.463	0.000	82.050	0.0	-1.7	-0.003
0.25L	1.250	98.213	0.000	17.878	0.0	-0.9	-0.054
Jt. 8	0.000	191.963	0.000	-163.481	0.0	-0.1	0.000

Maximum +ve Bending Moment 82.183 kN.m at 2.560m from joint 8
Maximum -ve Bending Moment -163.481 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 5 MEMBER 10

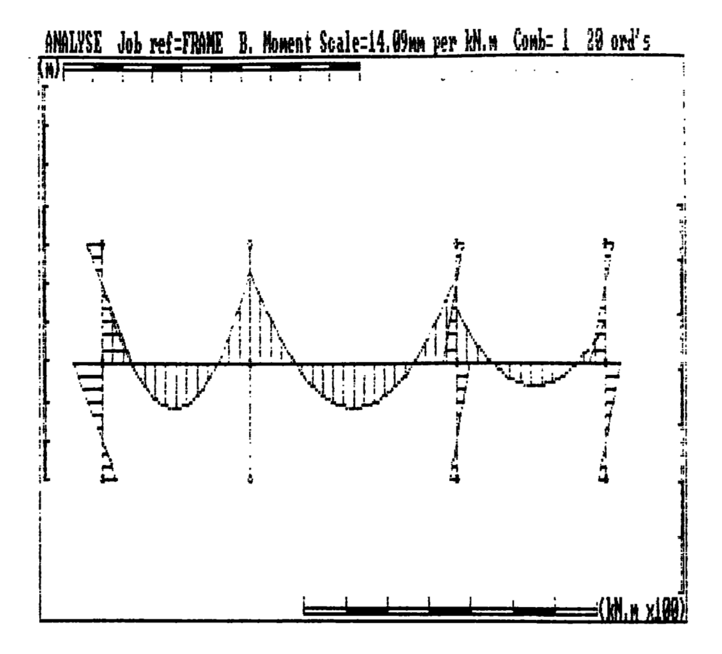
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	3.000	35.292	91.519	70.584	0.0	0.0	90.013
0.75L	2.250	35.292	91.519	44.115	0.1	0.0	90.003
0.50L	1.500	35.292	91.519	17.646	0.1	0.0	89.997
0.25L	0.750	35.292	91.519	-8.823	0.0	0.0	89.996
Jt. 10	0.000	35.292	91.519	-35.292	0.0	0.0	90.000

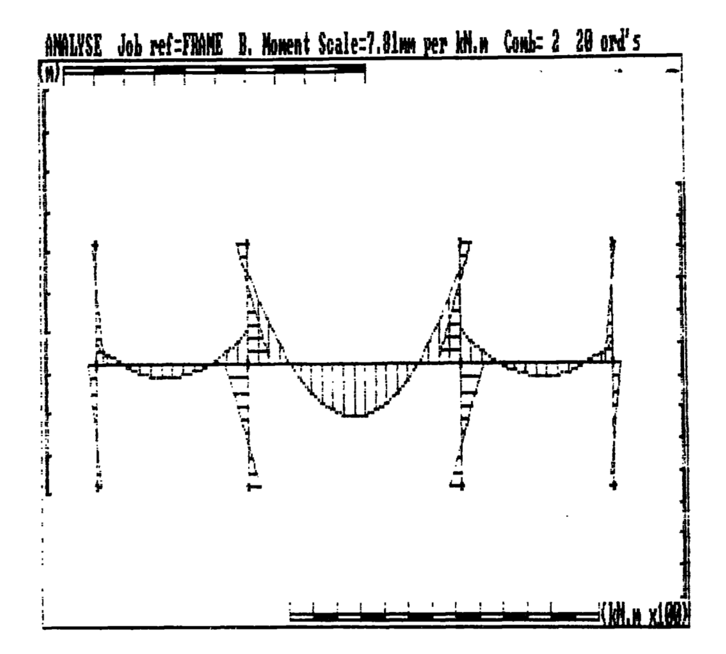
Maximum +ve Bending Moment 70.584 kN.m at 3.000m from joint 10
Maximum -ve Bending Moment -35.292 kN.m at 0.000m from joint 10

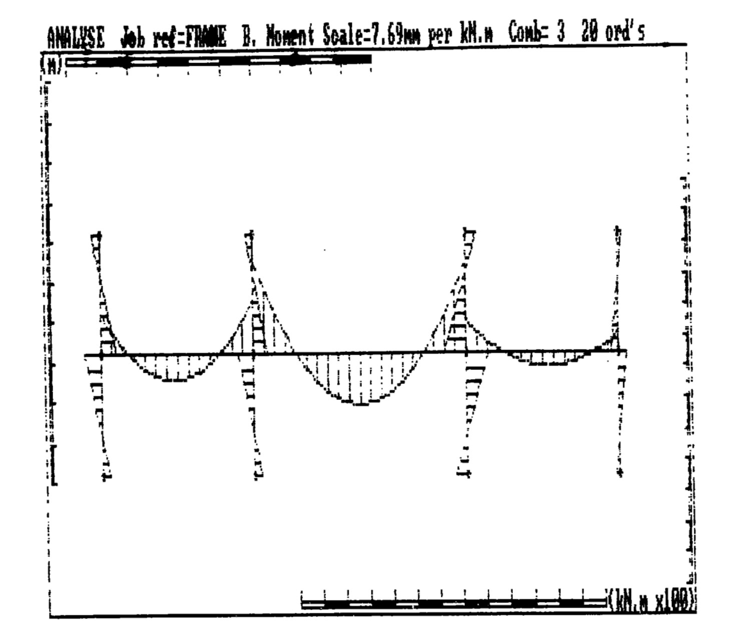
RESULTS FOR COMBINATION 5 MEMBER 11

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	35.292	-91.519	35.292	0.0	0.0	90.000
0.75L	2.250	35.292	-91.519	8.823	0.0	0.0	89.996
0.50L	1.500	35.292	-91.519	-17.646	-0.1	0.0	89.997
0.25L	0.750	35.292	-91.519	-44.115	-0.1	0.0	90.003
Jt. 11	0.000	35.292	-91.519	-70.584	0.0	0.0	90.013

Maximum +ve Bending Moment 35.292 kN.m at 3.000m from joint 11


ANALYSE Job ref=FRAME B. Moment Scale=14.09mm per kN.m Comb= 1 20 ord's
(m)
(kN.m x100)

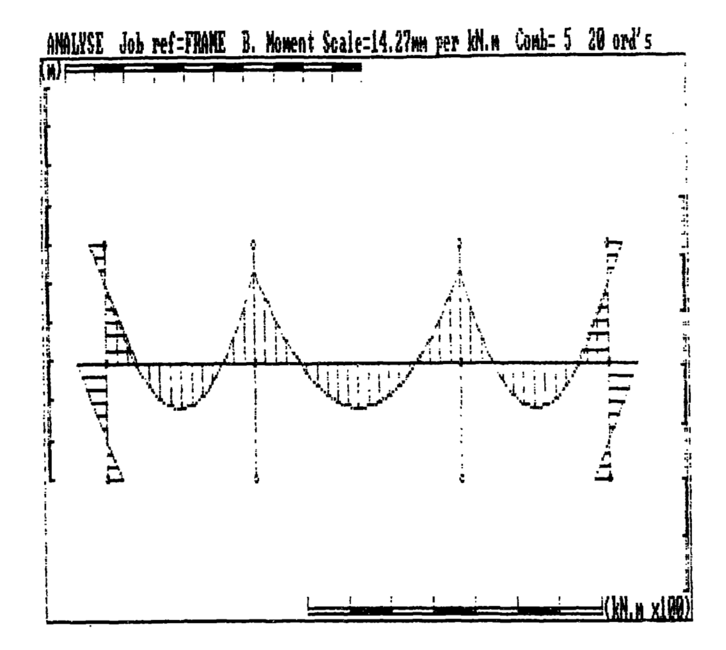

ANALYSE Job ref=FRAME B. Moment Scale=7.81mm per kN.m Comb= 2 20 ord's
(m)
(kN.m x100)


ANALYSE Job ref=FRAME B. Moment Scale=7.69mm per kN.m Comb= 3 20 ord's
(M)
(kN.m x100)

ANALYSE Job ref=FRAME B. Moment Scale=7.74mm per kN.m Comb= 4 20 ord's

(m)

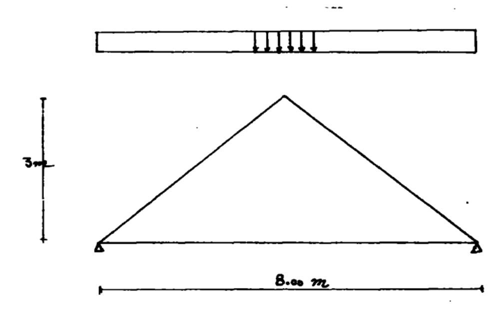
(kN.m x100)



ANALYSE Job ref=FRAME B. Moment Scale=14.27mm per kN.m Comb= 5 20 ord's
(m)
(kN.m x100)

مثال : كما بالرسم أطار هيكلى (Frame) وعليه الأحمال الموضحة

DL = 4 t/m` , LL = 3 t/m`



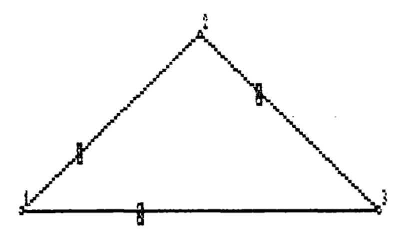
- ندخل احداثيات نقاط المنشا وكذلك أعضائه وحالة الوصلات كالتالى:

Joint	X(m)	Y(m)
1	0	0
2	4	3
3	8	0

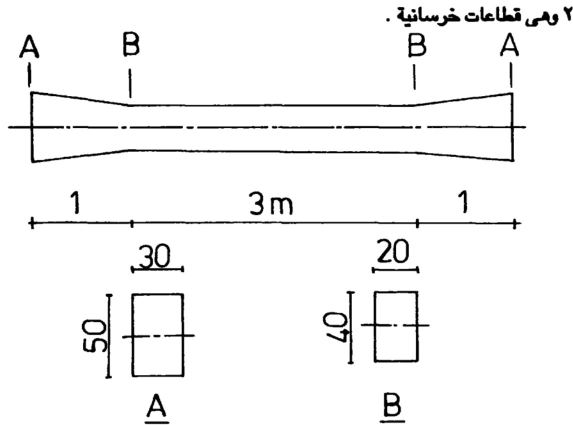
Member	Jt.1	Jnt.Con	Jt.2	Jnt.Con
1	1	F	2	F
2	2	F	3	F
3	1	p	3	p

- تم توصيف العضو رقم (٣) على أنه (Steel tie)

- نضغط [D] لشاهدة رسم المنشا كالآتى :



- ندخل خصائص قطاعات واعضاء المنشأ (Properties) كما بالرسم للأعضاء ١ ، ٢ وهى قطاعات خرسانية .



أما العضو الثالث فهو شداد على هيئة سيخ حديدى مساحته = ١٩,٦٥ سم ٢ .

ويتم ادخال تلك البيانات باستخدام العناصر [Elements] وذلك للاعضاء ١ ، ٢ مع تعريفها على أنها غير منتظمة المقطع (Non Prismatic) أما العضو الثالث فيمكن ادخال المساحة وعزم القصور مباشرة فى جدول القطاعات (Table of sections) ويراعى ادخال قيمة معامل ينج للخرسانة للاعضاء ١ ، ٢ والحديد للعضو رقم ٣ .

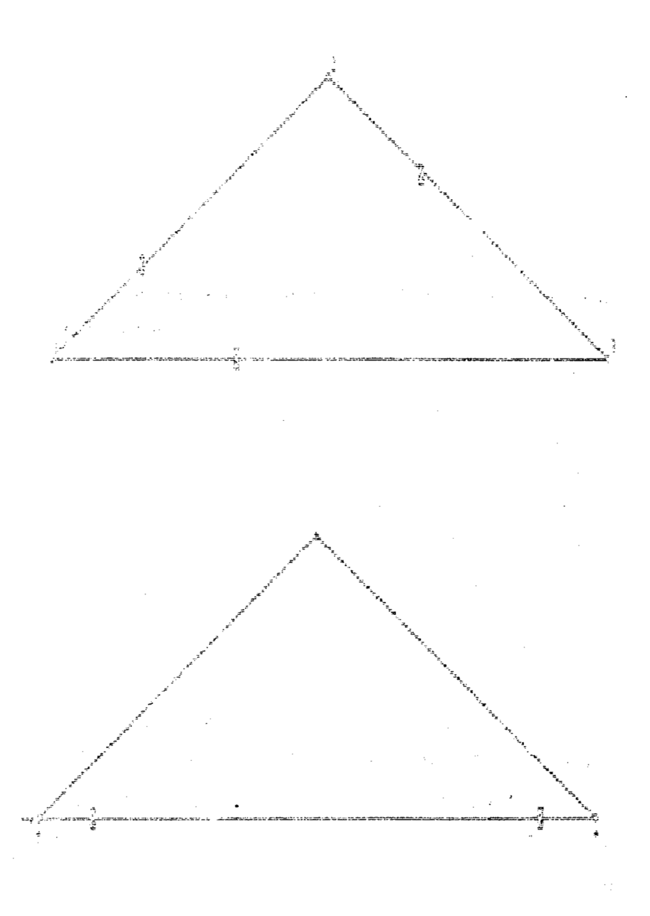


Table of Section			Member Section Properties						
Section No	Area (cm2)	Inertia (cm4)	No. of Elements	Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	1500.000	312500.00	1	1	5.000	n			
2	800.000	106666.67	1						
3	0.000								

Segment (s) of Member 1

Seg. No.	Segment Length	Section No. End1	End2
1	1.000	1	2
2	3.000	2	2
3	1.000	2	1

Table of Section			Member Section Properties						
Section No	Area (cm2)	Inertia (cm4)	No. of Elements	Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	1500.000	312500.00	1	1	5.000	N	3		21000.000
2	800.000	106666.67	1	2	5.000	N	3		21000.000
3	19.650	36.66	0	3	8.000	p	1	3	210000.000
4									

ندخل بيانات الركائز Supports كما بالجدول :

Joint	Support	X Restraint	Y Restraint	A Restraint
1	Hinge	Full	Full	Zero
3	Roller	Zero	Full	Zero

– ندخل اسماء الأحمال (Load Case names)

1- Dead Load

2 - Live Load

– ند خل قيم الاحمال الموزعة بانتظام على الاعضاء ١ ، ٢ كالاتى :

Dead Load UV 40 KN/m`

Live Load UV 30 KN/m`

– ندخل حالات التحميل وهي حالة واحدة للحمل الميت والحى على الاعضاء ١ ، ٢ .

– نضغط [٩] ثم [٢] للبدء فى الحل فتظهر خطوات الحل تباعا على الشاشة .

– تظهر بيانات ونتائج المنشأ كلها كالاتى :

Joint positions

Jt. No.	X coord (m)	Y coord (m)
1	0.000<	0.000
2	4.000	3.000
3	8.000	0.000
4		

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Member location and fixity

Mem No.	J1. no.	Jnt con	X1 Coord (m)	Y1 Coord (m)	J2. no.	Jnt con	X2 Coord (m)	Y2 Coord (m)	Length (m)	Slope (deg)
1	1<	F	0.000	0.000	2	F	4.000	3.000	5.000	36.870
2	2	F	4.000	3.000	3	F	8.000	0.000	5.000	-36.870
3	1	P	0.000	0.000	3	P	8.000	0.000	8.000	0.000
4										

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections				Member Section Properties				
Section No.	Area (cm2)	Inertia (cm4)	No. of Elements	Mem No.	Member Length	N/P	No. Sec. Seq No.	Modulus E (N/mm2)
1	1500.000	312500.00	1	1	5.000	N	3	21000.000
2	800.000	106666.67	1	2	5.000	N	3	21000.000

3	19.650	30.66	0	3	8.000 P	1	3	210000.000
4								

Elements of Section no. 1

Elem No.	Y-dim (mm)	B-dim (mm)	D-dim (mm)
1	0.000	300.000	500.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections / **Member Section Properties**

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements	Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	1500.000	312500.00	1	1	5.000	N	3		21000.000
2	800.000	106666.67	1	2	5.000	N	3		21000.000
3	19.650	30.66	0	3	8.000	P	1	3	210000.000
4									

Elements of Section no. 2

Elem No.	Y-dim (mm)	B-dim (mm)	D-dim (mm)
1	0.000<	200.000	400.000

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections / **Member Section Properties**

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements	Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1 .	1500.000	312500.00	1	1	5.000	N	3		21000.000
2	800.000	106666.67	1	2	5.000	N	3		21000.000
3	19.650	30.66	0	3	8.000	P	1	3	210000.000
4									

Segment(s) of Member 1

Seg.	Segment Section No.

No.	Length	End1	End2
1	1.000	1	2
2	3.000	2	2
3	1.000	2	1

Input mode

.

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Table of Sections

Section No.	Area (cm2)	Inertia (cm4)	No. of Elements
1	1500.000	312500.00	1
2	800.000	106666.67	1
3	19.650	30.66	0
4			

Member Section Properties

Mem No.	Member Length	N/P	No. Seg	Sec. No.	Modulus E (N/mm2)
1	5.000	N	3		21000.000
2	5.000	N	3		21000.000
3	8.000	P	1	3	210000.000

Segment(s) of Member 2

Seg. No.	Segment Length	Section No. End1	End2
1	1.000<	1	2
2	3.000	2	2
3	1.000	2	1

Input mode

F1	F2	F6	F7	F8	F9	F10	ESC	NUMLOCK
Help	Calc	Top	Up	Down	Commnd	Bottom	Escape	is ON

Supports

No.	Jnt Pos	X Restraint (kN/mm)	Y Restraint (kN/mm)	A Restraint (kNm/rad)
1	1	FULL	FULL	ZERO
2	3	ZERO	FULL	ZERO
3				

Input mode

```
  F1     F2              F6     F7     F8     F9     F10    ESC           NUMLOCK
 Help   Calc             Top    Up     Down  Commnd Bottom Escape           is ON

MEMBER LOADS   Loads & moments on Member 1  (length = 5.000m slope = 36.870deg)
Mem   No.of    Ld.  Load case          Load  Start Loaded  ( kN, kN.m or kN/m )
No.   Loads    No.  Number & name      Type Pos(m) Len(m) Start val.   End val.
  1      2       1   1          Dead Load UV                    40.000
  2      2       2   2          live load UV                    30.000
  3      0       3
```

Input mode

```
  F1     F2              F6     F7     F8     F9     F10    ESC           NUMLOCK
 Help   Calc             Top    Up     Down  Commnd Bottom Escape           is ON

MEMBER LOADS   Loads & moments on Member 2  (length = 5.000m slope = -36.870deg
Mem   No.of    Ld.  Load case          Load  Start Loaded  ( kN, kN.m or kN/m )
No.   Loads    No.  Number & name      Type Pos(m) Len(m) Start val.   End val.
  1      2       1   1          Dead Load UV                    40.000
  2      2       2   2          live load UV                    30.000
  3      0       3
```

Input mode

```
  F1     F2              F6     F7     F8     F9     F10    ESC           NUMLOCK
 Help   Calc             Top    Up     Down  Commnd Bottom Escape           is ON

Safety Factors for Combination  1
Load Case               Safety
Number and name         factor
```

```
1         Dead Load      1.000
2         live load      1.000
```

Input mode

```
  F1     F2                F6      F7      F8      F9      F10     ESC              NUMLOCK
 Help   Calc               Top     Up     Down   Commnd  Bottom  Escape              is ON
==========================================================================================
*                             * EGYPTIAN ENGINEERS                * JOB : TFRAME
*-----------------------------*-----------------------------------*-----------------------
*                             * FOR COMPUTERS ( E E C )           * DATE: 1992
*                             * 190 EL_SUDAN ST.,MOHANDESSIN      *-----------------------
*                             *       I N P U T    D A T A        *SHEET:       5
*-----------------------------------------------------------------------------------------
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==========================================================================================
FRAME GEOMETRY

No. of Joints = 3

MEMBERS
---:------ End 1 Details ------:------ End 2 Details ------:----------:---------
Mem:Jt.:C:  X coord :  Y coord :Jt.:C:  X Coord :  Y Coord :  Length :  Slope
No.:no.: :      (m) :      (m) :no.: :      (m) :      (m) :     (m) :  (deg)
---:---:-:----------:----------:---:-:----------:----------:---------:---------
  1:  1:F:    0.000 :    0.000 :  2:F:    4.000 :    3.000 :   5.000 :  36.87
  2:  2:F:    4.000 :    3.000 :  3:F:    8.000 :    0.000 :   5.000 : -36.87
  3:  1:P:    0.000 :    0.000 :  3:P:    8.000 :    0.000 :   8.000 :   0.00
==========================================================================================
TABLE OF SECTIONS

Section :    Area:   Inertia: Rectangular Elements (if specified)
Number  :  (cm2):     (cm4): No:  D (mm):   B (mm):   Y (mm)
--------:--------:----------:---:--------:---------:-------------
   1    : 1500.00: 312500.0:  1:  500.00:   300.00:     0.00
--------:--------:----------:---:--------:---------:-------------
   2    :  800.00: 106666.7:  1:  400.00:   200.00:     0.00
--------:--------:----------:---:--------:---------:-------------
   3    :   19.65:     30.7:   :        :         :
--------:--------:----------:---:--------:---------:-------------
==========================================================================================
SUMMARY OF MEMBER PROPERTIES

Member 1 NON PRISMATIC : Modulus E =   21000.0 N/mm2
```

```
Segment  1 Length =  1.000 m: End 1 Section No. =  1 : End 2 Section No. =  2
   ''    2   ''      3.000 m:  ''      ''     ''    2 :  ''      ''     ''   2
   ''    3   ''      1.000 m:  ''      ''     ''    2 :  ''      ''     ''   1
--------------------------------------------------------------------------------
Member 2 NON PRISMATIC : Modulus E =   21000.0 N/mm2

Segment  1 Length =  1.000 m: End 1 Section No. =  1 : End 2 Section No. =  2
   ''    2   ''      3.000 m:  ''      ''     ''    2 :  ''      ''     ''   2
   ''    3   ''      1.000 m:  ''      ''     ''    2 :  ''      ''     ''   1
--------------------------------------------------------------------------------
Member 3 PRISMATIC : Section Number  3 : Modulus E =  210000.0 N/mm2
================================================================================
SUPPORTS

No. of Supports =  2

  Joint : X Restraint : Y Restraint : Angular Restraint
 Number :   ( kN/mm ) :   ( kN/mm ) :   ( kN.m/radian )
--------:-------------:-------------:-------------------
    1   :    FULL     :    FULL     :       ZERO
    3   :    ZERO     :    FULL     :       ZERO
================================================================================
```

```
================================================================================
*                          * EGYPTIAN ENGINEERS             * JOB : TFRAME
*--------------------------*--------------------------------*-------------------
*                          * FOR COMPUTERS ( E E C )        * DATE: 1992
*                          * 190 EL_SUDAN ST.,MOHANDESSIN   *-------------------
*                          *      I N P U T   D A T A       *SHEET:      6
*-------------------------------------------------------------------------------
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================================================================================
APPLIED LOADS AND MOMENTS

MEMBERS 1 - 2

L O A D   C A S E   :LOAD: P O S I T I O N    : L O A D / M O M E N T
No : Name           :Type:    Start:   Length:   Start Value:       End Value
---:----------------:----:---------:----------:--------------:---------------
  1:       Dead Load: UV :         :          :   40.000 kN/m:
  2:       live load: UV :         :          :   30.000 kN/m:
================================================================================
COMBINATIONS

                    : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E   : Combination Number
No : Name           :  1
--------------------:-----
  1:       Dead Load:1.000
  2:       live load:1.000
================================================================================
```

```
================================================================================
*                                  * EGYPTIAN ENGINEERS               * JOB : TFRAME
*----------------------------------*----------------------------------*----------------
*                                  * FOR COMPUTERS ( E E C )          * DATE: 1992
*                                  * 190 EL_SUDAN ST.,MOHANDESSIN     *----------------
*                                  * A N A L Y S I S   R E S U L T S  *SHEET:       7
*-------------------------------------------------------------------------------------
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================================================================================
```

RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0055	0.000	280.000	0.000
2	2.29	-4.27	0.0000			
3	4.59	0.00	0.0055	0.000	280.000	0.000

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-560.000	-2240.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-560.000	-2240.000
Summation	0.000	560.000	2240.000

Summation	0.000	0.000	0.000

Maxima for Member 1

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-141.920	357.227	0.000	75.190	1.832	-149.602	5.000

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	141.920	357.227	0.000	75.190	3.168	-149.602	0.000

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	236.534	0.000	0.000	0.000	0.00C

RESULTS FOR COMBINATION 1 MEMBER 1

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	5.000	-141.920	189.227	-149.602	2.3	-4.3	36.870
0.75L	3.750	-85.920	231.227	-7.202	3.4	-5.5	36.997
0.50L	2.500	-29.920	273.227	65.199	4.7	-7.0	36.886
0.25L	1.250	26.080	315.227	67.599	3.6	-5.1	36.655
Jt. 1	0.000	82.080	357.227	0.000	0.0	0.0	36.555

Maximum +ve Bending Moment 75.190 kN.m at 1.832m from joint 1
Maximum -ve Bending Moment -149.602 kN.m at 5.000m from joint 1

RESULTS FOR COMBINATION 1 MEMBER 2

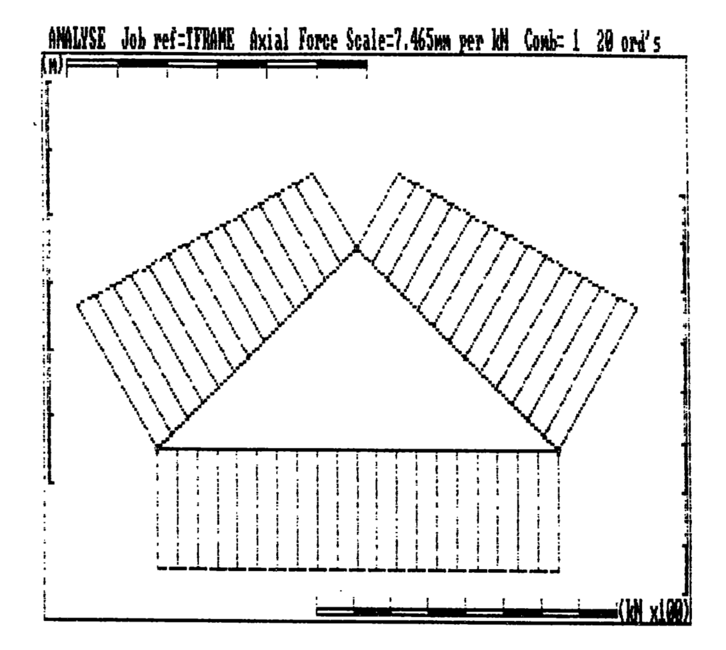
Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	5.000	-82.080	357.227	0.000	4.6	0.0	-36.555
0.75L	3.750	-26.080	315.227	67.599	1.0	-5.1	-36.655
0.50L	2.500	29.920	273.227	65.199	-0.1	-7.0	-36.886
0.25L	1.250	85.920	231.227	-7.202	1.2	-5.5	-36.997
Jt. 2	0.000	141.920	189.227	-149.602	2.3	-4.3	-36.870

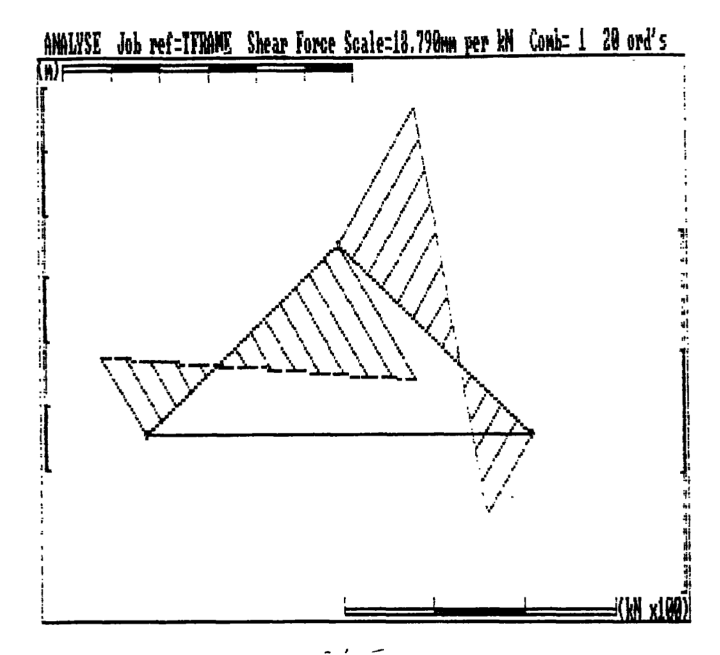
Maximum +ve Bending Moment 75.190 kN.m at 3.168m from joint 2

ANALYSE Job ref=TFRAME B. Moment Scale=17.83mm per kN.m Comb= 1 20 ord's

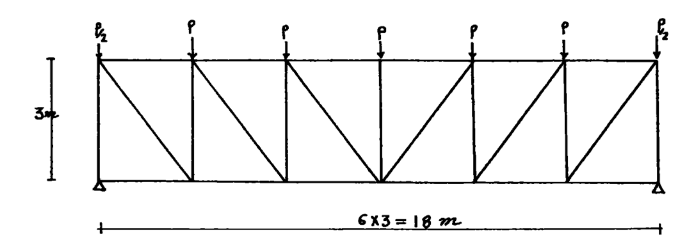
(m)

(kN.m x100)


ANALYSE Job ref=TFRAME Axial Force Scale=7.465mm per kN Comb= 1 20 ord's
(m)
(kN x100)


ANALYSE Job ref=TFRAME Shear Force Scale=18.790mm per kN Comb= 1 20 ord's
(m)
(kN x100)

مثال : كما بالرسم جمالون حديدى (Truss) وعليه الأحمال الموضحة بالرسم :



P(D.L) = 0.72 t

P(L.L) = 0.9 t

- قطاع الجمالون كما بالرسم :

70 X 70 X 7 mm

60 X 60 X 6 mm

60 X 60 X 60 mm

- تظهر بيانات ونتائج المنشأ كالاتى :

		JOB : TRUSS
		DATE:
	INPUT DATA	SHEET: 16

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FRAME GEOMETRY

No. of Joints = 14

MEMBERS

Mem No.	Jt. no.	C	End 1 Details X coord (m)	End 1 Details Y coord (m)	Jt. no.	C	End 2 Details X Coord (m)	End 2 Details Y Coord (m)	Length (m)	Slope (deg)
1	2	P	0.000	3.000	4	P	3.000	3.000	3.000	0.00
2	4	P	3.000	3.000	6	P	6.000	3.000	3.000	0.00
3	6	P	6.000	3.000	8	P	9.000	3.000	3.000	0.00
4	8	P	9.000	3.000	10	P	12.000	3.000	3.000	0.00
5	10	P	12.000	3.000	12	P	15.000	3.000	3.000	0.00
6	12	P	15.000	3.000	14	P	18.000	3.000	3.000	0.00
7	1	F	0.000	0.000	3	P	3.000	0.000	3.000	0.00
8	3	P	3.000	0.000	5	F	6.000	0.000	3.000	0.00
9	5	P	6.000	0.000	7	F	9.000	0.000	3.000	0.00
10	7	P	9.000	0.000	9	F	12.000	0.000	3.000	0.00
11	9	P	12.000	0.000	11	F	15.000	0.000	3.000	0.00
12	11	P	15.000	0.000	13	F	18.000	0.000	3.000	0.00
13	1	P	0.000	0.000	2	F	0.000	3.000	3.000	90.00
14	3	P	3.000	0.000	4	F	3.000	3.000	3.000	90.00
15	5	P	6.000	0.000	6	F	6.000	3.000	3.000	90.00
16	7	P	9.000	0.000	8	F	9.000	3.000	3.000	90.00
17	9	P	12.000	0.000	10	F	12.000	3.000	3.000	90.00
18	11	P	15.000	0.000	12	F	15.000	3.000	3.000	90.00
19	13	P	18.000	0.000	14	F	18.000	3.000	3.000	90.00
20	2	P	0.000	3.000	3	F	3.000	0.000	4.243	-45.00
21	4	P	3.000	3.000	5	P	6.000	0.000	4.243	-45.00
22	6	P	6.000	3.000	7	P	9.000	0.000	4.243	-45.00
23	7	P	9.000	0.000	10	P	12.000	3.000	4.243	45.00
24	9	P	12.000	0.000	12	P	15.000	3.000	4.243	45.00
25	11	P	15.000	0.000	14	P	18.000	3.000	4.243	45.00

TABLE OF SECTIONS

Section Number	Area: (cm2):	Inertia: (cm4):	Rectangular Elements (if specified) No:	D (mm):	B (mm):	Y (mm)
1	18.80	84.8				
2	13.82	45.6				

SUMMARY OF MEMBER PROPERTIES

Member 1 - 6 PRISMATIC : Section Number 1 : Modulus E = 210000.0 N/mm2

Member 7 - 25 PRISMATIC : Section Number 2 : Modulus E = 210000.0 N/mm2

		* JOB : TRUSS
		* DATE:
	I N P U T D A T A	*SHEET: 17

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SUPPORTS

No. of Supports = 2

Joint Number	X Restraint (kN/mm)	Y Restraint (kN/mm)	Angular Restraint (kN.m/radian)
1	FULL	FULL	ZERO
13	FULL	FULL	ZERO

APPLIED LOADS AND MOMENTS

JOINT 2

LOAD CASE No	Name	LOAD: Type	LOAD / MOMENT Value
1:	Dead Load:	PV	3.600 kN
2:	LIVE LOAD:	PV	4.500 kN

JOINT 4

LOAD CASE No	Name	LOAD: Type	LOAD / MOMENT Value
1:	Dead Load:	PV	7.200 kN
2:	LIVE LOAD:	PV	9.000 kN

JOINT 6

```
L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:    Value
---:----------------:----:----------------
  1:       Dead Load: PV :       7.200 kN
  2:       LIVE LOAD: PV :       9.000 kN
-------------------------------------------------------------------------------
JOINT 8

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:    Value
---:----------------:----:----------------
  1:       Dead Load: PV :       7.200 kN
  2:       LIVE LOAD: PV :       9.000 kN
-------------------------------------------------------------------------------
JOINT 10

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:    Value
---:----------------:----:----------------
  1:       Dead Load: PV :       7.200 kN
  2:       LIVE LOAD: PV :       9.000 kN
-------------------------------------------------------------------------------



===============================================================================
*                            *                                * JOB : TRUSS
*----------------------------*--------------------------------*----------------
*                            *                                * DATE:
*                            *                                *----------------
*                            *     I N P U T   D A T A        *SHEET:    18
*------------------------------------------------------------------------------
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===============================================================================
APPLIED LOADS AND MOMENTS Continued

JOINT 12

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:    Value
---:----------------:----:----------------
  1:       Dead Load: PV :       7.200 kN
  2:       LIVE LOAD: PV :       9.000 kN
-------------------------------------------------------------------------------
JOINT 14

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:    Value
---:----------------:----:----------------
  1:       Dead Load: PV :       3.600 kN
  2:       LIVE LOAD: PV :       4.500 kN
===============================================================================
COMBINATIONS

                    : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E   : Combination Number
No : Name           :  1
--------------------:-----
```

1: Dead Load:1.000
2: LIVE LOAD:1.000

*	*	* JOB : TRUSS
*	*	* DATE:
*	* A N A L Y S I S R E S U L T S	*SHEET: 19

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RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0011	35.100	48.600	0.000
2	1.35	-0.50	-0.0005			
3	-0.36	-3.40	-0.0008			
4	1.05	-3.82	-0.0005			
5	-0.31	-5.89	-0.0008			
6	0.55	-6.14	-0.0003			
7	0.00	-6.93	-0.0003			
8	0.00	-7.10	0.0000			
9	0.31	-5.89	0.0003			
10	-0.55	-6.14	0.0003			
11	0.36	-3.40	0.0008			
12	-1.05	-3.82	0.0005			
13	0.00	0.00	0.0011	-35.100	48.600	0.000

```
   14        -1.35      -0.50     0.0005
---------------------------------------------------------------------------------
Summation of Forces and Moments .

                       Px (kN)      Py (kN)     Mo (kN.m)
Member Loads            0.000        0.000        0.000
Joint Loads             0.000      -97.200     -874.800
                  ---------------------------------------
Reactions               0.000      -97.200     -874.800
Summation               0.000       97.200      874.800
                  ---------------------------------------
Summation               0.000        0.000        0.000
---------------------------------------------------------------------------------
Maxima for Member 1

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000     40.500       0.000     0.000    0.000      0.000    0.000
---------------------------------------------------------------------------------
Maxima for Member 2

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000     64.800       0.000     0.000    0.000      0.000    0.000
---------------------------------------------------------------------------------
Maxima for Member 3

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000     72.900       0.000 .   0.000    0.000      0.000    0.000
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Maxima for Member 4

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000     72.900       0.000     0.000    0.000      0.000    0.000
---------------------------------------------------------------------------------
Maxima for Member 5

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000     64.800       0.000     0.000    0.000      0.000    0.000
---------------------------------------------------------------------------------
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Maxima for Member 6

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000      40.500      0.000      0.000    0.000      0.000    0.000
--------------------------------------------------------------------------------
Maxima for Member 7

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000      35.100      0.000      0.000    3.000      0.000    0.000
--------------------------------------------------------------------------------
Maxima for Member 8

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000       0.000      5.400      0.000    3.000      0.000    0.000
--------------------------------------------------------------------------------
Maxima for Member 9

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000       0.000     29.700      0.000    0.000      0.000    0.000
--------------------------------------------------------------------------------
Maxima for Member 10

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000       0.000     29.700      0.000    0.000      0.000    3.000
--------------------------------------------------------------------------------
Maxima for Member 11

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000       0.000      5.400      0.000    0.000      0.000    0.000
--------------------------------------------------------------------------------
Maxima for Member 12

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000      35.100      0.000      0.000    0.000      0.000    3.000
--------------------------------------------------------------------------------


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Maxima for Member 13

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000      48.600      0.000      0.000    3.000      0.000    0.000
--------------------------------------------------------------------------------
```

Maxima for Member 14

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	40.500	0.000	0.000	3.000	0.000	0.000

Maxima for Member 15

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	24.300	0.000	0.000	3.000	0.000	0.000

Maxima for Member 16

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	16.200	0.000	0.000	3.000	0.000	0.000

Maxima for Member 17

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	24.300	0.000	0.000	0.000	0.000	0.000

Maxima for Member 18

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	40.500	0.000	0.000	0.000	0.000	3.000

Maxima for Member 19

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	48.600	0.000	0.000	0.000	0.000	3.000

Maxima for Member 20

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	57.276	0.000	4.243	0.000	0.000

Maxima for Member 21

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	34.365	0.000	4.243	0.000	0.000

```
Maxima for Member 22

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000       0.000     11.455      0.000    4.243     0.000    0.00C
-------------------------------------------------------------------------------
Maxima for Member 23

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000       0.000     11.455      0.000    0.000     0.000    4.243
-------------------------------------------------------------------------------
Maxima for Member 24

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000       0.000     34.365      0.000    0.000     0.000    4.243
-------------------------------------------------------------------------------
Maxima for Member 25

Load  Shear (kN)    Maximum Axial (kN)  <------- Bending Moment (kN.m) ------->
Comb. (Abs. Max.)(Compression) (Tension) Max.+ve   Pos. (m)  Max.-ve   Pos. (m)
  1        0.000       0.000     57.276      0.000    0.000     0.000    4.243
-------------------------------------------------------------------------------
RESULTS FOR COMBINATION  1  MEMBER  1

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy   Slope
    from End 1        (kN)         (kN)        (kN.m)     (mm)      (mm)  (deg)
Jt. 4    3.000       0.000       40.500         0.000      1.0      -3.8 -0.063
0.75L    2.250       0.000       40.500         0.000      1.1      -3.0 -0.063
0.50L    1.500       0.000       40.500         0.000      1.2      -2.2 -0.063
0.25L    0.750       0.000       40.500         0.000      1.3      -1.3 -0.063
Jt. 2    0.000       0.000       40.500         0.000      1.4      -0.5 -0.063

Maximum +ve Bending Moment       0.000 kN.m at    0.000m from joint  2
Maximum -ve Bending Moment       0.000 kN.m at    0.000m from joint  2
-------------------------------------------------------------------------------
RESULTS FOR COMBINATION  1  MEMBER  2

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy   Slope
    from End 1        (kN)         (kN)        (kN.m)     (mm)      (mm)  (deg)
Jt. 6    3.000       0.000       64.800         0.000      0.6      -6.1 -0.044
0.75L    2.250       0.000       64.800         0.000      0.7      -5.6 -0.044
0.50L    1.500       0.000       64.800         0.000      0.8      -5.0 -0.044
0.25L    0.750       0.000       64.800         0.000      0.9      -4.4 -0.044
Jt. 4    0.000       0.000       64.800         0.000      1.0      -3.8 -0.044

Maximum +ve Bending Moment       0.000 kN.m at    0.000m from joint  4
Maximum -ve Bending Moment       0.000 kN.m at    0.000m from joint  4
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RESULTS FOR COMBINATION 1 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	0.000	72.900	0.000	0.0	-7.1	-0.018
0.75L	2.250	0.000	72.900	0.000	0.1	-6.9	-0.018
0.50L	1.500	0.000	72.900	0.000	0.3	-6.6	-0.018
0.25L	0.750	0.000	72.900	0.000	0.4	-6.4	-0.018
Jt. 6	0.000	0.000	72.900	0.000	0.6	-6.1	-0.018

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 6
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 6

RESULTS FOR COMBINATION 1 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 10	3.000	0.000	72.900	0.000	-0.6	-6.1	0.018
0.75L	2.250	0.000	72.900	0.000	-0.4	-6.4	0.018
0.50L	1.500	0.000	72.900	0.000	-0.3	-6.6	0.018
0.25L	0.750	0.000	72.900	0.000	-0.1	-6.9	0.018
Jt. 8	0.000	0.000	72.900	0.000	0.0	-7.1	0.018

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 8
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 1 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	0.000	64.800	0.000	-1.0	-3.8	0.044
0.75L	2.250	0.000	64.800	0.000	-0.9	-4.4	0.044
0.50L	1.500	0.000	64.800	0.000	-0.8	-5.0	0.044
0.25L	0.750	0.000	64.800	0.000	-0.7	-5.6	0.044
Jt. 10	0.000	0.000	64.800	0.000	-0.6	-6.1	0.044

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 10
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 10

RESULTS FOR COMBINATION 1 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	3.000	0.000	40.500	0.000	-1.4	-0.5	0.063
0.75L	2.250	0.000	40.500	0.000	-1.3	-1.3	0.063
0.50L	1.500	0.000	40.500	0.000	-1.2	-2.2	0.063
0.25L	0.750	0.000	40.500	0.000	-1.1	-3.0	0.063
Jt. 12	0.000	0.000	40.500	0.000	-1.0	-3.8	0.063

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 12
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 12

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RESULTS FOR COMBINATION 1 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	3.000	0.000	35.100	0.000	-0.4	-3.4	-0.065
0.75L	2.250	0.000	35.100	0.000	-0.3	-2.6	-0.065
0.50L	1.500	0.000	35.100	0.000	-0.2	-1.7	-0.065
0.25L	0.750	0.000	35.100	0.000	-0.1	-0.9	-0.065
Jt. 1	0.000	0.000	35.100	0.000	0.0	0.0	-0.065

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 1
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 1

RESULTS FOR COMBINATION 1 MEMBER 8

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	3.000	0.000	-5.400	0.000	-0.3	-5.9	-0.047
0.75L	2.250	0.000	-5.400	0.000	-0.3	-5.3	-0.047
0.50L	1.500	0.000	-5.400	0.000	-0.3	-4.6	-0.047
0.25L	0.750	0.000	-5.400	0.000	-0.3	-4.0	-0.047
Jt. 3	0.000	0.000	-5.400	0.000	-0.4	-3.4	-0.047

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 3
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 3

RESULTS FOR COMBINATION 1 MEMBER 9

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	3.000	0.000	-29.700	0.000	0.0	-6.9	-0.020
0.75L	2.250	0.000	-29.700	0.000	-0.1	-6.7	-0.020
0.50L	1.500	0.000	-29.700	0.000	-0.2	-6.4	-0.020
0.25L	0.750	0.000	-29.700	0.000	-0.2	-6.1	-0.020
Jt. 5	0.000	0.000	-29.700	0.000	-0.3	-5.9	-0.020

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 1 MEMBER 10

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 9	3.000	0.000	-29.700	0.000	0.3	-5.9	0.020
0.75L	2.250	0.000	-29.700	0.000	0.2	-6.1	0.020
0.50L	1.500	0.000	-29.700	0.000	0.2	-6.4	0.020
0.25L	0.750	0.000	-29.700	0.000	0.1	-6.7	0.020
Jt. 7	0.000	0.000	-29.700	0.000	0.0	-6.9	0.020

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Maximum +ve Bending Moment        0.000 kN.m at    0.000m from joint  7
Maximum -ve Bending Moment        0.000 kN.m at    3.000m from joint  7
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RESULTS FOR COMBINATION  1  MEMBER  11
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Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	3.000	0.000	-5.400	0.000	0.4	-3.4	0.047
0.75L	2.250	0.000	-5.400	0.000	0.3	-4.0	0.047
0.50L	1.500	0.000	-5.400	0.000	0.3	-4.6	0.047
0.25L	0.750	0.000	-5.400	0.000	0.3	-5.3	0.047
Jt. 9	0.000	0.000	-5.400	0.000	0.3	-5.9	0.047

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Maximum +ve Bending Moment        0.000 kN.m at    0.000m from joint  9
Maximum -ve Bending Moment        0.000 kN.m at    0.000m from joint  9
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RESULTS FOR COMBINATION  1  MEMBER  12
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Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 13	3.000	0.000	35.100	0.000	0.0	0.0	0.065
0.75L	2.250	0.000	35.100	0.000	0.1	-0.9	0.065
0.50L	1.500	0.000	35.100	0.000	0.2	-1.7	0.065
0.25L	0.750	0.000	35.100	0.000	0.3	-2.6	0.065
Jt. 11	0.000	0.000	35.100	0.000	0.4	-3.4	0.065

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Maximum +ve Bending Moment        0.000 kN.m at    0.000m from joint  11
Maximum -ve Bending Moment        0.000 kN.m at    3.000m from joint  11
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RESULTS FOR COMBINATION  1  MEMBER  13
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Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	3.000	0.000	48.600	0.000	1.4	-0.5	89.974
0.75L	2.250	0.000	48.600	0.000	1.0	-0.4	89.974
0.50L	1.500	0.000	48.600	0.000	0.7	-0.3	89.974
0.25L	0.750	0.000	48.600	0.000	0.3	-0.1	89.974
Jt. 1	0.000	0.000	48.600	0.000	0.0	0.0	89.974

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Maximum +ve Bending Moment        0.000 kN.m at    3.000m from joint  1
Maximum -ve Bending Moment        0.000 kN.m at    0.000m from joint  1
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RESULTS FOR COMBINATION  1  MEMBER  14

  Position (m)  Shear Force  Axial Comp.  Bend.Moment     dx       dy   Slope
```

from End 1		(kN)	(kN)	(kN.m)	(mm)	(mm)	(deg)
Jt. 4	3.000	0.000	40.500	0.000	1.0	-3.8	89.973
0.75L	2.250	0.000	40.500	0.000	0.7	-3.7	89.973
0.50L	1.500	0.000	40.500	0.000	0.3	-3.6	89.973
0.25L	0.750	0.000	40.500	0.000	0.0	-3.5	89.973
Jt. 3	0.000	0.000	40.500	0.000	-0.4	-3.4	89.973

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 3
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 3

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RESULTS FOR COMBINATION 1 MEMBER 15

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	0.000	24.300	0.000	0.6	-6.1	89.984
0.75L	2.250	0.000	24.300	0.000	0.3	-6.1	89.984
0.50L	1.500	0.000	24.300	0.000	0.1	-6.0	89.984
0.25L	0.750	0.000	24.300	0.000	-0.1	-5.9	89.984
Jt. 5	0.000	0.000	24.300	0.000	-0.3	-5.9	89.984

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 5
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 1 MEMBER 16

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	0.000	16.200	0.000	0.0	-7.1	90.000
0.75L	2.250	0.000	16.200	0.000	0.0	-7.1	90.000
0.50L	1.500	0.000	16.200	0.000	0.0	-7.0	90.000
0.25L	0.750	0.000	16.200	0.000	0.0	-7.0	90.000
Jt. 7	0.000	0.000	16.200	0.000	0.0	-6.9	90.000

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 7

RESULTS FOR COMBINATION 1 MEMBER 17

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 10	3.000	0.000	24.300	0.000	-0.6	-6.1	90.016
0.75L	2.250	0.000	24.300	0.000	-0.3	-6.1	90.016
0.50L	1.500	0.000	24.300	0.000	-0.1	-6.0	90.016
0.25L	0.750	0.000	24.300	0.000	0.1	-5.9	90.016
Jt. 9	0.000	0.000	24.300	0.000	0.3	-5.9	90.016

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 9
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 9

RESULTS FOR COMBINATION 1 MEMBER 18

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	0.000	40.500	0.000	-1.0	-3.8	90.027
0.75L	2.250	0.000	40.500	0.000	-0.7	-3.7	90.027
0.50L	1.500	0.000	40.500	0.000	-0.3	-3.6	90.027
0.25L	0.750	0.000	40.500	0.000	0.0	-3.5	90.027
Jt. 11	0.000	0.000	40.500	0.000	0.4	-3.4	90.027

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 11
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 11

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RESULTS FOR COMBINATION 1 MEMBER 19

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	3.000	0.000	48.600	0.000	-1.4	-0.5	90.026
0.75L	2.250	0.000	48.600	0.000	-1.0	-0.4	90.026
0.50L	1.500	0.000	48.600	0.000	-0.7	-0.3	90.026
0.25L	0.750	0.000	48.600	0.000	-0.3	-0.1	90.026
Jt. 13	0.000	0.000	48.600	0.000	0.0	0.0	90.026

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 13
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 13

RESULTS FOR COMBINATION 1 MEMBER 20

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.243	0.000	-57.276	0.000	-0.4	-3.4	-45.044
0.75L	3.182	0.000	-57.276	0.000	0.1	-2.7	-45.044
0.50L	2.121	0.000	-57.276	0.000	0.5	-2.0	-45.044
0.25L	1.061	0.000	-57.276	0.000	0.9	-1.2	-45.044
Jt. 2	0.000	0.000	-57.276	0.000	1.4	-0.5	-45.044

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 2
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 21

Position (m) from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)

Jt. 5	4.243	0.000	-34.365	0.000	-0.3	-5.9	-45.033
0.75L	3.182	0.000	-34.365	0.000	0.0	-5.4	-45.033
0.50L	2.121	0.000	-34.365	0.000	0.4	-4.9	-45.033
0.25L	1.061	0.000	-34.365	0.000	0.7	-4.3	-45.033
Jt. 4	0.000	0.000	-34.365	0.000	1.0	-3.8	-45.033

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 1 MEMBER 22

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	4.243	0.000	-11.455	0.000	0.0	-6.9	-45.013
0.75L	3.182	0.000	-11.455	0.000	0.1	-6.7	-45.013
0.50L	2.121	0.000	-11.455	0.000	0.3	-6.5	-45.013
0.25L	1.061	0.000	-11.455	0.000	0.4	-6.3	-45.013
Jt. 6	0.000	0.000	-11.455	0.000	0.6	-6.1	-45.013

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 6
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 6

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	ANALYSIS RESULTS	SHEET: 28

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RESULTS FOR COMBINATION 1 MEMBER 23

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 10	4.243	0.000	-11.455	0.000	-0.6	-6.1	45.013
0.75L	3.182	0.000	-11.455	0.000	-0.4	-6.3	45.013
0.50L	2.121	0.000	-11.455	0.000	-0.3	-6.5	45.013
0.25L	1.061	0.000	-11.455	0.000	-0.1	-6.7	45.013
Jt. 7	0.000	0.000	-11.455	0.000	0.0	-6.9	45.013

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 7

RESULTS FOR COMBINATION 1 MEMBER 24

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	4.243	0.000	-34.365	0.000	-1.0	-3.8	45.033
0.75L	3.182	0.000	-34.365	0.000	-0.7	-4.3	45.033
0.50L	2.121	0.000	-34.365	0.000	-0.4	-4.9	45.033
0.25L	1.061	0.000	-34.365	0.000	0.0	-5.4	45.033
Jt. 9	0.000	0.000	-34.365	0.000	0.3	-5.9	45.033

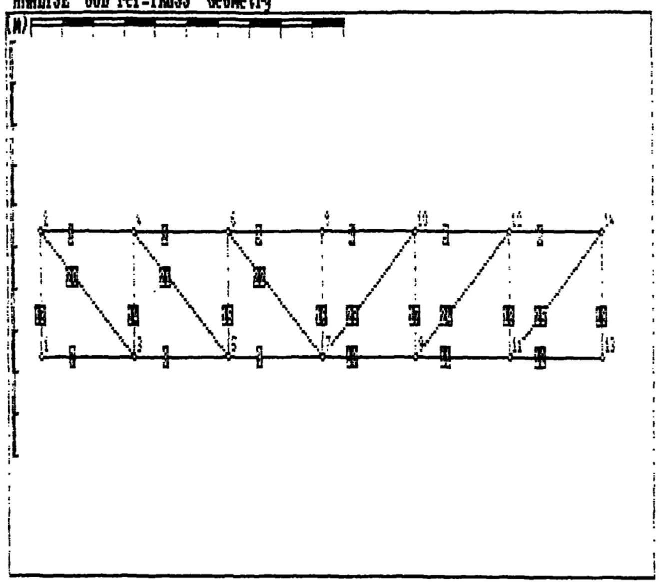
Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 9

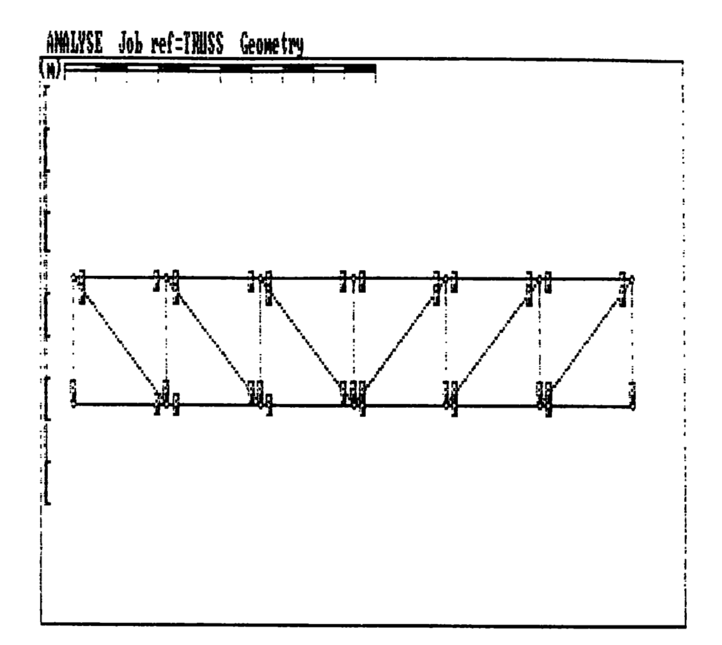
Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 9

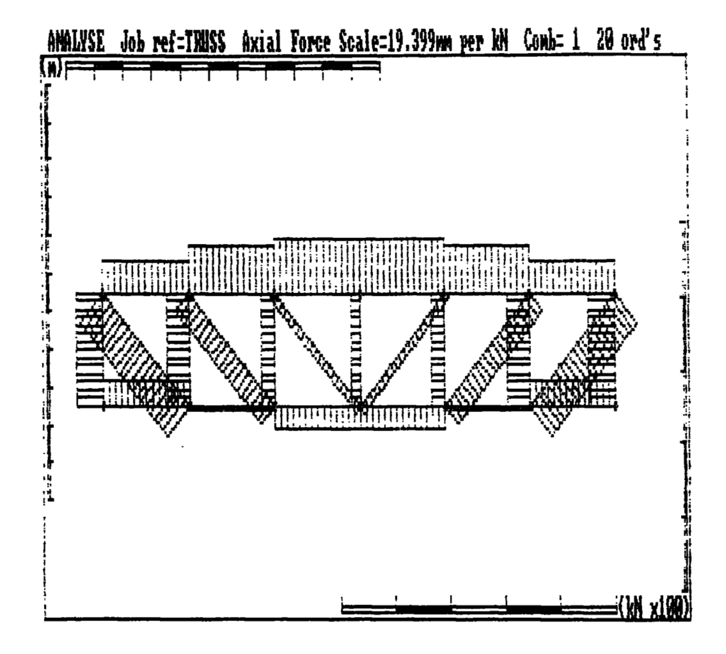
RESULTS FOR COMBINATION 1 MEMBER 25

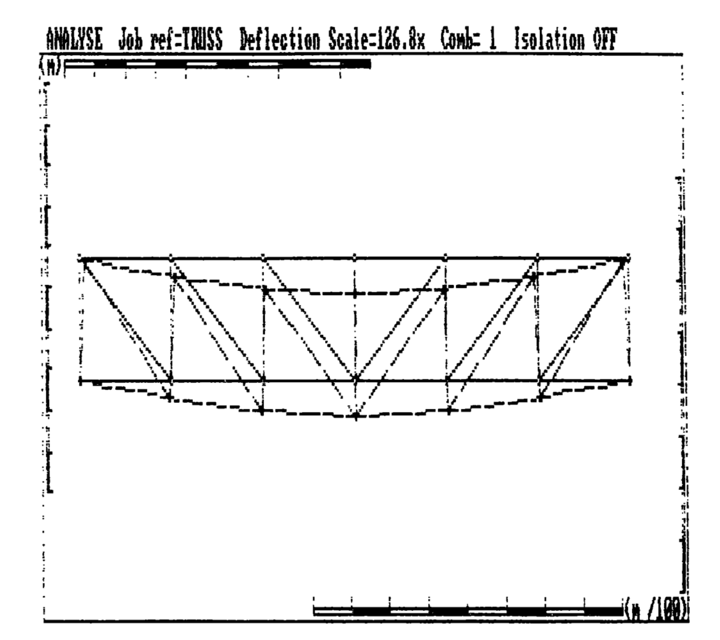
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	4.243	0.000	-57.276	0.000	-1.4	-0.5	45.044
0.75L	3.182	0.000	-57.276	0.000	-0.9	-1.2	45.044
0.50L	2.121	0.000	-57.276	0.000	-0.5	-2.0	45.044
0.25L	1.061	0.000	-57.276	0.000	-0.1	-2.7	45.044
Jt. 11	0.000	0.000	-57.276	0.000	0.4	-3.4	45.044

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 11
Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 11

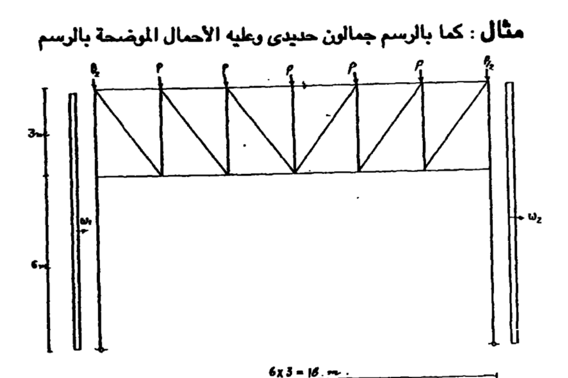

ANALYSE Job ref=TRUSS Geometry
(m)


ANALYSE Job ref=TRUSS Geometry
(m)


ANALYSE Job ref=TRUSS Axial Force Scale=19.399mm per kN Comb= 1 20 ord's
(m)
(kN x100)


ANALYSE Job ref=TRUSS Deflection Scale=126.8x Comb= 1 Isolation OFF
(m)
(m /100)

مثال : كما بالرسم جمالون حديدى وعليه الأحمال الموضحة بالرسم



P (D.L) = 0.72 t

P (L.L) = 0.9 t

W1 = 0.6 t / m`

W2 = 0.3 t / m`

- قطاع الجمالون كما بالرسم

70 X 70 X 7 mm

60 X 60 X 6 mm

60 X 60 X 6 mm

- قطاع الأعمدة IPE 400

- تظهر بيانات ونتائج المنشأ كالاتى :

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*                              *                             * JOB : COLT
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FRAME GEOMETRY

No. of Joints = 16

MEMBERS

Mem No.	End 1 Jt. no.	C	End 1 X coord (m)	End 1 Y coord (m)	End 2 Jt. no.	C	End 2 X Coord (m)	End 2 Y Coord (m)	Length (m)	Slope (deg)
1	2	P	0.000	3.000	4	P	3.000	3.000	3.000	0.00
2	4	P	3.000	3.000	6	P	6.000	3.000	3.000	0.00
3	6	P	6.000	3.000	8	P	9.000	3.000	3.000	0.00
4	8	P	9.000	3.000	10	P	12.000	3.000	3.000	0.00
5	10	P	12.000	3.000	12	P	15.000	3.000	3.000	0.00
6	12	P	15.000	3.000	14	P	18.000	3.000	3.000	0.00
7	1	P	0.000	0.000	3	P	3.000	0.000	3.000	0.00
8	3	P	3.000	0.000	5	F	6.000	0.000	3.000	0.00
9	5	P	6.000	0.000	7	F	9.000	0.000	3.000	0.00
10	7	P	9.000	0.000	9	F	12.000	0.000	3.000	0.00
11	9	P	12.000	0.000	11	F	15.000	0.000	3.000	0.00
12	11	P	15.000	0.000	13	P	18.000	0.000	3.000	0.00
13	1	F	0.000	0.000	2	F	0.000	3.000	3.000	90.00
14	3	P	3.000	0.000	4	F	3.000	3.000	3.000	90.00
15	5	P	6.000	0.000	6	F	6.000	3.000	3.000	90.00
16	7	P	9.000	0.000	8	F	9.000	3.000	3.000	90.00
17	9	P	12.000	0.000	10	F	12.000	3.000	3.000	90.00
18	11	P	15.000	0.000	12	F	15.000	3.000	3.000	90.00
19	13	F	18.000	0.000	14	F	18.000	3.000	3.000	90.00
20	2	P	0.000	3.000	3	F	3.000	0.000	4.243	-45.00
21	4	P	3.000	3.000	5	P	6.000	0.000	4.243	-45.00
22	6	P	6.000	3.000	7	P	9.000	0.000	4.243	-45.00
23	7	P	9.000	0.000	10	P	12.000	3.000	4.243	45.00
24	9	P	12.000	0.000	12	P	15.000	3.000	4.243	45.00
25	11	P	15.000	0.000	14	P	18.000	3.000	4.243	45.00
26	15	F	0.000	-6.000	1	F	0.000	0.000	6.000	90.00
27	16	F	18.000	-6.000	13	F	18.000	0.000	6.000	90.00

TABLE OF SECTIONS

Section Number	Area (cm2)	Inertia (cm4)	Rectangular Elements (if specified) No	D (mm)	B (mm)	Y (mm)
1	18.80	84.8				
2	13.82	45.6				
3	84.50	23130.0				

SUMMARY OF MEMBER PROPERTIES

Member 1 - 6 PRISMATIC : Section Number 1 : Modulus E = 210000.0 N/mm2

Member 7 - 12 PRISMATIC : Section Number 2 : Modulus E = 210000.0 N/mm2

(Continued on Next Page)

SUMMARY OF MEMBER PROPERTIES continued

Member 13 PRISMATIC : Section Number 3 : Modulus E = 210000.0 N/mm2

Member 14 - 18 PRISMATIC : Section Number 2 : Modulus E = 210000.0 N/mm2

Member 19 PRISMATIC : Section Number 3 : Modulus E = 210000.0 N/mm2

Member 20 - 25 PRISMATIC : Section Number 2 : Modulus E = 210000.0 N/mm2

Member 26 - 27 PRISMATIC : Section Number 3 : Modulus E = 210000.0 N/mm2

SUPPORTS

No. of Supports = 2

Joint Number	X Restraint (kN/mm)	Y Restraint (kN/mm)	Angular Restraint (kN.m/radian)
15	FULL	FULL	ZERO
16	FULL	FULL	ZERO

APPLIED LOADS AND MOMENTS

MEMBER 13

LOAD CASE No	Name	LOAD Type	POSITION Start	Length	LOAD / MOMENT Start Value	End Value
3	WIND LOAD	UH			6.000 kN/m	

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-----------------------------------------------------------------------------
MEMBER 19

L O A D   C A S E   :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name           :Type:    Start:    Length:    Start Value:      End Value
---:----------------:----:----------:----------:---------------:--------------
  3:       WIND LOAD: UH :          :          :    3.000 kN/m:
-----------------------------------------------------------------------------
MEMBER 26

L O A D   C A S E   :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name           :Type:    Start:    Length:    Start Value:      End Value
---:----------------:----:----------:----------:---------------:--------------
  3:       WIND LOAD: UH :          :          :    6.000 kN/m:
-----------------------------------------------------------------------------
MEMBER 27

L O A D   C A S E   :LOAD: P O S I T I O N     : L O A D / M O M E N T
No : Name           :Type:    Start:    Length:    Start Value:      End Value
---:----------------:----:----------:----------:---------------:--------------
  3:       WIND LOAD: UH :          :          :    3.000 kN/m:
-----------------------------------------------------------------------------




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APPLIED LOADS AND MOMENTS Continued

JOINT 2

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:    Value
---:----------------:----:----------------
  1:       Dead Load: PV :     3.600 kN
  2:       LIVE LOAD: PV :     4.500 kN
-----------------------------------------------------------------------------
JOINT 4

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:    Value
---:----------------:----:----------------
  1:       Dead Load: PV :     7.200 kN
  2:       LIVE LOAD: PV :     9.000 kN
-----------------------------------------------------------------------------
JOINT 6

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:    Value
---:----------------:----:----------------
  1:       Dead Load: PV :     7.200 kN
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  2:        LIVE LOAD: PV :        9.000 kN
----------------------------------------------------------------------------
JOINT 8

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:   Value
---:----------------:----:---------------
  1:        Dead Load: PV :        7.200 kN
  2:        LIVE LOAD: PV :        9.000 kN
----------------------------------------------------------------------------
JOINT 10

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:   Value
---:----------------:----:---------------
  1:        Dead Load: PV :        7.200 kN
  2:        LIVE LOAD: PV :        9.000 kN
----------------------------------------------------------------------------
JOINT 12

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:   Value
---:----------------:----:---------------
  1:        Dead Load: PV :        7.200 kN
  2:        LIVE LOAD: PV :        9.000 kN
----------------------------------------------------------------------------
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*                          *                              * JOB : COLT
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APPLIED LOADS AND MOMENTS Continued

JOINT 14

L O A D   C A S E   :LOAD: LOAD / MOMENT
No : Name           :Type:   Value
---:----------------:----:---------------
  1:        Dead Load: PV :        3.600 kN
  2:        LIVE LOAD: PV :        4.500 kN
============================================================================
COMBINATIONS

                    : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E   : Combination Number
No : Name           :  1  :  2
--------------------:-----:-----
  1:        Dead Load:1.000:1.000
  2:        LIVE LOAD:1.000:1.000

  3:        WIND LOAD:     :1.000
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		JOB : COLT
		DATE:
	ANALYSIS RESULTS	SHEET: 5

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RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	-0.87	-0.16	-0.0004			
2	1.25	-0.25	-0.0009			
3	-0.95	-3.63	-0.0009			
4	0.98	-4.04	-0.C006			
5	-0.60	-6.33	-0.0009			
6	0.52	-6.58	-0.0004			
7	0.00	-7.34	-0.0003			
8	0.00	-7.50	0.0000			
9	0.60	-6.33	0.0003			
10	-0.52	-6.58	0.0004			
11	0.95	-3.63	0.0009			
12	-0.98	-4.04	0.0006			
13	0.87	-0.16	0.0004			
14	-1.25	-0.25	0.0009			
15	0.00	0.00	0.0004	2.303	48.600	0.000
16	0.00	0.00	-0.0004	-2.303	48.600	0.000

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	0.000	0.000
Joint Loads	0.000	-97.200	-874.800
Reactions	0.000	-97.200	-874.800
Summation	0.000	97.200	874.800
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 2

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	69.04	-0.10	-0.0044			
2	72.94	-0.14	0.0003			
3	69.51	-4.16	-0.0012			
4	72.35	-4.37	-0.0009			
5	70.19	-6.64	-0.0008			
6	71.73	-6.68	-0.0005			
7	70.92	-7.13	-0.0002			
8	71.20	-7.30	-0.0001			
9	71.22	-5.60	0.0005			
10	70.67	-6.06	0.0002			
11	71.06	-2.80	0.0009			
12	70.36	-3.43	0.0002			
13	70.28	-0.23	-0.0038			
14	70.38	-0.35	0.0019			
15	0.00	0.00	-0.0156	-42.176	28.350	0.000
16	0.00	0.00	-0.0160	-38.824	68.850	0.000

RESULTS FOR COMBINATION 2 continued

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	81.000	0.000	121.500
Joint Loads	0.000	-97.200	-874.800
Reactions	81.000	-97.200	-753.300
Summation	-81.000	97.200	753.300
Summation	0.000	0.000	0.000

Maxima for Member 1

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	35.894	0.000	0.000	0.000	0.000	0.000
2	0.000	77.602	0.000	0.000	0.000	0.000	0.000

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	60.194	0.000	0.000	0.000	0.000	0.000
2	0.000	81.652	0.000	0.000	0.000	0.000	0.000

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	68.294	0.000	0.000	0.000	0.000	0.000
2	0.000	69.502	0.000	0.000	0.000	0.000	0.000

Maxima for Member 4

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	68.294	0.000	0.000	0.000	0.000	0.000
2	0.000	69.502	0.000	0.000	0.000	0.000	0.000

Maxima for Member 5

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	60.194	0.000	0.000	0.000	0.000	0.000
2	0.000	41.152	0.000	0.000	0.000	0.000	0.000

Maxima for Member 6

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	35.894	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	3.398	0.000	0.000	0.000	0.000

Maxima for Member 7

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) ------- Max.+ve	Pos. (m)	Max.-ve	------> Pos. (m)
1	0.000	6.909	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	45.528	0.000	0.000	0.000	0.000

Maxima for Member 8

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) ------- Max.+ve	Pos. (m)	Max.-ve	------> Pos. (m)
1	0.000	0.000	33.591	0.000	3.000	0.000	0.000
2	0.000	0.000	65.778	0.000	0.000	0.000	3.000

Maxima for Member 9

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) ------- Max.+ve	Pos. (m)	Max.-ve	------> Pos. (m)
1	0.000	0.000	57.891	0.000	0.000	0.000	3.000
2	0.000	0.000	69.828	0.000	3.000	0.000	0.000

Maxima for Member 10

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) ------- Max.+ve	Pos. (m)	Max.-ve	------> Pos. (m)
1	0.000	0.000	57.891	0.000	0.000	0.000	3.000
2	0.000	0.000	29.328	0.000	0.000	0.000	3.000

Maxima for Member 11

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) ------- Max.+ve	Pos. (m)	Max.-ve	------> Pos. (m)
1	0.000	0.000	33.591	0.000	0.000	0.000	3.000
2	0.000	15.222	0.000	0.000	3.000	0.000	0.000

Maxima for Member 12

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) ------- Max.+ve	Pos. (m)	Max.-ve	------> Pos. (m)
1	0.000	6.909	0.000	0.000	0.000	0.000	0.000
2	0.000	75.972	0.000	0.000	0.000	0.000	0.000

Maxima for Member 13

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) ------- Max.+ve	Pos. (m)	Max.-ve	------> Pos. (m)
1	4.606	48.600	0.000	0.000	3.000	-13.819	0.000
2	-57.352	28.350	0.000	145.057	0.000	0.000	3.000

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Maxima for Member 14

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	40.500	0.000	0.000	3.000	0.000	0.000
2	0.000	20.250	0.000	0.000	3.000	0.000	0.000

Maxima for Member 15

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	24.300	0.000	0.000	3.000	0.000	0.000
2	0.000	4.050	0.000	0.000	0.000	0.000	3.000

Maxima for Member 16

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	16.200	0.000	0.000	0.000	0.000	3.000
2	0.000	16.200	0.000	0.000	3.000	0.000	0.000

Maxima for Member 17

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	24.300	0.000	0.000	0.000	0.000	3.000
2	0.000	44.550	0.000	0.000	0.000	0.000	3.000

Maxima for Member 18

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	40.500	0.000	0.000	0.000	0.000	3.000
2	0.000	60.750	0.000	0.000	3.000	0.000	0.000

Maxima for Member 19

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-4.606	48.600	0.000	13.819	0.000	0.000	3.000
2	-64.148	68.850	0.000	178.943	0.000	0.000	3.000

Maxima for Member 20

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	57.276	0.000	4.243	0.000	0.000
2	0.000	0.000	28.638	0.000	4.243	0.000	0.000

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Maxima for Member 21

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	34.365	0.000	4.243	0.000	0.000
2	0.000	0.000	5.728	0.000	4.243	0.000	0.000

Maxima for Member 22

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	11.455	0.000	4.243	0.000	0.000
2	0.000	17.183	0.000	0.000	4.243	0.000	0.000

Maxima for Member 23

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	11.455	0.000	0.000	0.000	4.243
2	0.000	0.000	40.093	0.000	0.000	0.000	4.243

Maxima for Member 24

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	34.365	0.000	0.000	0.000	4.243
2	0.000	0.000	63.003	0.000	0.000	0.000	4.243

Maxima for Member 25

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	0.000	0.000	57.276	0.000	0.000	0.000	4.243
2	0.000	0.000	85.913	0.000	0.000	0.000	4.243

Maxima for Member 26

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-2.303	48.600	0.000	0.000	0.000	-13.819	6.000
2	42.176	28.350	0.000	145.057	6.000	0.000	0.000

Maxima for Member 27

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	2.303	48.600	0.000	13.819	6.000	0.000	0.000
2	38.824	68.850	0.000	178.943	6.000	0.000	0.000

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RESULTS FOR COMBINATION  1  MEMBER  1

 Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy    Slope
   from End 1         (kN)         (kN)       (kN.m)    (mm)      (mm)    (deg)
Jt. 4    3.000       0.000       35.894        0.000     1.0      -4.0   -0.073
0.75L    2.250       0.000       35.894        0.000     1.0      -3.1   -0.073
0.50L    1.500       0.000       35.894        0.000     1.1      -2.1   -0.073
0.25L    0.750       0.000       35.894        0.000     1.2      -1.2   -0.073
Jt. 2    0.000       0.000       35.894        0.000     1.2      -0.2   -0.073

Maximum +ve Bending Moment       0.000 kN.m at     0.000m from joint  2
Maximum -ve Bending Moment       0.000 kN.m at     0.000m from joint  2
--------------------------------------------------------------------------------
RESULTS FOR COMBINATION  1  MEMBER  2

 Position (m)  Shear Force  Axial.Comp.  Bend.Moment      dx        dy    Slope
   from End 1         (kN)         (kN)       (kN.m)    (mm)      (mm)    (deg)
Jt. 6    3.000       0.000       60.194        0.000     0.5      -6.6   -0.048
0.75L    2.250       0.000       60.194        0.000     0.6      -5.9   -0.048
0.50L    1.500       0.000       60.194        0.000     0.7      -5.3   -0.048
0.25L    0.750       0.000       60.194        0.000     0.9      -4.7   -0.048
Jt. 4    0.000       0.000       60.194        0.000     1.0      -4.0   -0.048

Maximum +ve Bending Moment       0.000 kN.m at     0.000m from joint  4
Maximum -ve Bending Moment       0.000 kN.m at     0.000m from joint  4
--------------------------------------------------------------------------------
RESULTS FOR COMBINATION  1  MEMBER  3

 Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy    Slope
   from End 1         (kN)         (kN)       (kN.m)    (mm)      (mm)    (deg)
Jt. 8    3.000       0.000       68.294        0.000     0.0      -7.5   -0.018
0.75L    2.250       0.000       68.294        0.000     0.1      -7.3   -0.018
0.50L    1.500       0.000       68.294        0.000     0.3      -7.0   -0.018
0.25L    0.750       0.000       68.294        0.000     0.4      -6.8   -0.018
Jt. 6    0.000       0.000       68.294        0.0G0     0.5      -6.6   -0.018

Maximum +ve Bending Moment       0.000 kN.m at     0.000m from joint  6
Maximum -ve Bending Moment       0.000 kN.m at     0.000m from joint  6
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RESULTS FOR COMBINATION  1  MEMBER  4

 Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy    Slope
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Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 10	3.000	0.000	68.294	0.000	-0.5	-6.6	0.018
0.75L	2.250	0.000	68.294	0.000	-0.4	-6.8	0.018
0.50L	1.500	0.000	68.294	0.000	-0.3	-7.0	0.018
0.25L	0.750	0.000	68.294	0.000	-0.1	-7.3	0.018
Jt. 8	0.000	0.000	68.294	0.000	0.0	-7.5	0.018

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 8
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 8

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RESULTS FOR COMBINATION 1 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	0.000	60.194	0.000	-1.0	-4.0	0.048
0.75L	2.250	0.000	60.194	0.000	-0.9	-4.7	0.048
0.50L	1.500	0.000	60.194	0.000	-0.7	-5.3	0.048
0.25L	0.750	0.000	60.194	0.000	-0.6	-5.9	0.048
Jt. 10	0.000	0.000	60.194	0.000	-0.5	-6.6	0.048

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 10
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 10

RESULTS FOR COMBINATION 1 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	3.000	0.000	35.894	0.000	-1.2	-0.2	0.073
0.75L	2.250	0.000	35.894	0.000	-1.2	-1.2	0.073
0.50L	1.500	0.000	35.894	0.000	-1.1	-2.1	0.073
0.25L	0.750	0.000	35.894	0.000	-1.0	-3.1	0.073
Jt. 12	0.000	0.000	35.894	0.000	-1.0	-4.0	0.073

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 12
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 12

RESULTS FOR COMBINATION 1 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	3.000	0.000	6.909	0.000	-0.9	-3.6	-0.066
0.75L	2.250	0.000	6.909	0.000	-0.9	-2.8	-0.066
0.50L	1.500	0.000	6.909	0.000	-0.9	-1.9	-0.066
0.25L	0.750	0.000	6.909	0.000	-0.9	-1.0	-0.066
Jt. 1	0.000	0.000	6.909	0.000	-0.9	-0.2	-0.066

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Maximum +ve Bending Moment       0.000 kN.m at     0.000m from joint  1
Maximum -ve Bending Moment       0.000 kN.m at     0.000m from joint  1
--------------------------------------------------------------------------------
RESULTS FOR COMBINATION  1  MEMBER  8

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy    Slope
    from End 1         (kN)         (kN)       (kN.m)     (mm)      (mm)    (deg)
Jt. 5    3.000        0.000      -33.591        0.000     -0.6      -6.3   -0.052
0.75L    2.250        0.000      -33.591        0.000     -0.7      -5.7   -0.052
0.50L    1.500        0.000      -33.591        0.000     -0.8      -5.0   -0.052
0.25L    0.750        0.000      -33.591        0.000     -0.9      -4.3   -0.052
Jt. 3    0.000        0.000      -33.591        0.000     -0.9      -3.6   -0.052

Maximum +ve Bending Moment       0.000 kN.m at     3.000m from joint  3
Maximum -ve Bending Moment       0.000 kN.m at     0.000m from joint  3
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RESULTS FOR COMBINATION  1  MEMBER  9

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy    Slope
    from End 1         (kN)         (kN)       (kN.m)     (mm)      (mm)    (deg)
Jt. 7    3.000        0.000      -57.891        0.000      0.0      -7.3   -0.019
0.75L    2.250        0.000      -57.891        0.000     -0.1      -7.1   -0.019
0.50L    1.500        0.000      -57.891        0.000     -0.3      -6.8   -0.019
0.25L    0.750        0.000      -57.891        0.000     -0.4      -6.6   -0.019
Jt. 5    0.000        0.000      -57.891        0.000     -0.6      -6.3   -0.019

Maximum +ve Bending Moment       0.000 kN.m at     0.000m from joint  5
Maximum -ve Bending Moment       0.000 kN.m at     3.000m from joint  5
--------------------------------------------------------------------------------
RESULTS FOR COMBINATION  1  MEMBER  10

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy    Slope
    from End 1         (kN)         (kN)       (kN.m)     (mm)      (mm)    (deg)
Jt. 9    3.000        0.000      -57.891        0.000      0.6      -6.3    0.019
0.75L    2.250        0.000      -57.891        0.000      0.4      -6.6    0.019
0.50L    1.500        0.000      -57.891        0.000      0.3      -6.8    0.019
0.25L    0.750        0.000      -57.891        0.000      0.1      -7.1    0.019
Jt. 7    0.000        0.000      -57.891        0.000      0.0      -7.3    0.019

Maximum +ve Bending Moment       0.000 kN.m at     0.000m from joint  7
Maximum -ve Bending Moment       0.000 kN.m at     3.000m from joint  7
--------------------------------------------------------------------------------
RESULTS FOR COMBINATION  1  MEMBER  11

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy    Slope
    from End 1         (kN)         (kN)       (kN.m)     (mm)      (mm)    (deg)
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Jt. 11	3.000	0.000	-33.591	0.000	0.9	-3.6	0.052
0.75L	2.250	0.000	-33.591	0.000	0.9	-4.3	0.052
0.50L	1.500	0.000	-33.591	0.000	0.8	-5.0	0.052
0.25L	0.750	0.000	-33.591	0.000	0.7	-5.7	0.052
Jt. 9	0.000	0.000	-33.591	0.000	0.6	-6.3	0.052

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 9
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 9

RESULTS FOR COMBINATION 1 MEMBER 12

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 13	3.000	0.000	6.909	0.000	0.9	-0.2	0.066
0.75L	2.250	0.000	6.909	0.000	0.9	-1.0	0.066
0.50L	1.500	0.000	6.909	0.000	0.9	-1.9	0.066
0.25L	0.750	0.000	6.909	0.000	0.9	-2.8	0.066
Jt. 11	0.000	0.000	6.909	0.000	0.9	-3.6	0.066

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 11
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 11

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RESULTS FOR COMBINATION 1 MEMBER 13

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	3.000	4.606	48.600	0.000	1.2	-0.2	89.951
0.75L	2.250	4.606	48.600	-3.455	0.6	-0.2	89.953
0.50L	1.500	4.606	48.600	-6.909	0.0	-0.2	89.957
0.25L	0.750	4.606	48.600	-10.364	-0.5	-0.2	89.965
Jt. 1	0.000	4.606	48.600	-13.819	-0.9	-0.2	89.976

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 1
Maximum -ve Bending Moment -13.819 kN.m at 0.000m from joint 1

RESULTS FOR COMBINATION 1 MEMBER 14

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	0.000	40.500	0.000	1.0	-4.0	89.963
0.75L	2.250	0.000	40.500	0.000	0.5	-3.9	89.963
0.50L	1.500	0.000	40.500	0.000	0.0	-3.8	89.963
0.25L	0.750	0.000	40.500	0.000	-0.5	-3.7	89.963
Jt. 3	0.000	0.000	40.500	0.000	-0.9	-3.6	89.963

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 3

Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 3

RESULTS FOR COMBINATION 1 MEMBER 15

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	0.000	24.300	0.000	0.5	-6.6	89.979
0.75L	2.250	0.000	24.300	0.000	0.2	-6.5	89.979
0.50L	1.500	0.000	24.300	0.000	0.0	-6.5	89.979
0.25L	0.750	0.000	24.300	0.000	-0.3	-6.4	89.979
Jt. 5	0.000	0.000	24.300	0.000	-0.6	-6.3	89.979

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 5
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 1 MEMBER 16

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	0.000	16.200	0.000	0.0	-7.5	90.000
0.75L	2.250	0.000	16.200	0.000	0.0	-7.5	90.000
0.50L	1.500	0.000	16.200	0.000	0.0	-7.4	90.000
0.25L	0.750	0.000	16.200	0.000	0.0	-7.4	90.000
Jt. 7	0.000	0.000	16.200	0.000	0.0	-7.3	90.000

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 7

RESULTS FOR COMBINATION 1 MEMBER 17

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 10	3.000	0.000	24.300	0.000	-0.5	-6.6	90.021
0.75L	2.250	0.000	24.300	0.000	-0.2	-6.5	90.021
0.50L	1.500	0.000	24.300	0.000	0.0	-6.5	90.021
0.25L	0.750	0.000	24.300	0.000	0.3	-6.4	90.021
Jt. 9	0.000	0.000	24.300	0.000	0.6	-6.3	90.021

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 9
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 9

RESULTS FOR COMBINATION 1 MEMBER 18

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	0.000	40.500	0.000	-1.0	-4.0	90.037

0.75L	2.250	0.000	40.500	0.000	-0.5	-3.9	90.037
0.50L	1.500	0.000	40.500	0.000	0.0	-3.8	90.037
0.25L	0.750	0.000	40.500	0.000	0.5	-3.7	90.037
Jt. 11	0.000	0.000	40.500	0.000	0.9	-3.6	90.037

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 11
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 11

RESULTS FOR COMBINATION 1 MEMBER 19

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	3.000	-4.606	48.600	0.000	-1.2	-0.2	90.049
0.75L	2.250	-4.606	48.600	3.455	-0.6	-0.2	90.047
0.50L	1.500	-4.606	48.600	6.909	0.0	-0.2	90.043
0.25L	0.750	-4.606	48.600	10.364	0.5	-0.2	90.035
Jt. 13	0.000	-4.606	48.600	13.819	0.9	-0.2	90.024

Maximum +ve Bending Moment 13.819 kN.m at 0.000m from joint 13
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 13

RESULTS FOR COMBINATION 1 MEMBER 20

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.243	0.000	-57.276	0.000	-0.9	-3.6	-45.053
0.75L	3.182	0.000	-57.276	0.000	-0.4	-2.8	-45.053
0.50L	2.121	0.000	-57.276	0.000	0.2	-1.9	-45.053
0.25L	1.061	0.000	-57.276	0.000	0.7	-1.1	-45.053
Jt. 2	0.000	0.000	-57.276	0.000	1.2	-0.2	-45.053

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 2
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 21

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	4.243	0.000	-34.365	0.000	-0.6	-6.3	-45.037
0.75L	3.182	0.000	-34.365	0.000	-0.2	-5.8	-45.037
0.50L	2.121	0.000	-34.365	0.000	0.2	-5.2	-45.037
0.25L	1.061	0.000	-34.365	0.000	0.6	-4.6	-45.037
Jt. 4	0.000	0.000	-34.365	0.000	1.0	-4.0	-45.037

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 1 MEMBER 22

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	4.243	0.000	-11.455	0.000	0.0	-7.3	-45.012
0.75L	3.182	0.000	-11.455	0.000	0.1	-7.1	-45.012
0.50L	2.121	0.000	-11.455	0.000	0.3	-7.0	-45.012
0.25L	1.061	0.000	-11.455	0.000	0.4	-6.8	-45.012
Jt. 6	0.000	0.000	-11.455	0.000	0.5	-6.6	-45.012

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 6
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 6

RESULTS FOR COMBINATION 1 MEMBER 23

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 10	4.243	0.000	-11.455	0.000	-0.5	-6.6	45.012
0.75L	3.182	0.000	-11.455	0.000	-0.4	-6.8	45.012
0.50L	2.121	0.000	-11.455	0.000	-0.3	-7.0	45.012
0.25L	1.061	0.000	-11.455	0.000	-0.1	-7.1	45.012
Jt. 7	0.000	0.000	-11.455	0.000	0.0	-7.3	45.012

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 7

RESULTS FOR COMBINATION 1 MEMBER 24

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	4.243	0.000	-34.365	0.000	-1.0	-4.0	45.037
0.75L	3.182	0.000	-34.365	0.000	-0.6	-4.6	45.037
0.50L	2.121	0.000	-34.365	0.000	-0.2	-5.2	45.037
0.25L	1.061	0.000	-34.365	0.000	0.2	-5.8	45.037
Jt. 9	0.000	0.000	-34.365	0.000	0.6	-6.3	45.037

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 9
Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 9

RESULTS FOR COMBINATION 1 MEMBER 25

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	4.243	0.000	-57.276	0.000	-1.2	-0.2	45.053
0.75L	3.182	0.000	-57.276	0.000	-0.7	-1.1	45.053

0.50L	2.121	0.000	-57.276	0.000	-0.2	-1.9	45.053
0.25L	1.061	0.000	-57.276	0.000	0.4	-2.8	45.053
Jt. 11	0.000	0.000	-57.276	0.000	0.9	-3.6	45.053

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 11

Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 11

RESULTS FOR COMBINATION 1 MEMBER 26

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 1	6.000	-2.303	48.600	-13.819	-0.9	-0.2	89.976
0.75L	4.500	-2.303	48.600	-10.364	-1.2	-0.1	89.997
0.50L	3.000	-2.303	48.600	-6.909	-1.1	-0.1	90.012
0.25L	1.500	-2.303	48.600	-3.455	-0.6	0.0	90.022
Jt. 15	0.000	-2.303	48.600	0.000	0.0	0.0	90.025

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 15

Maximum -ve Bending Moment -13.819 kN.m at 6.000m from joint 15

RESULTS FOR COMBINATION 1 MEMBER 27

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 13	6.000	2.303	48.600	13.819	0.9	-0.2	90.024
0.75L	4.500	2.303	48.600	10.364	1.2	-0.1	90.003
0.50L	3.000	2.303	48.600	6.909	1.1	-0.1	89.988
0.25L	1.500	2.303	48.600	3.455	0.6	0.0	89.978
Jt. 16	0.000	2.303	48.600	0.000	0.0	0.0	89.975

Maximum +ve Bending Moment 13.819 kN.m at 6.000m from joint 16

Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 16

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RESULTS FOR COMBINATION 2 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	0.000	77.602	0.000	72.3	-4.4	-0.081
0.75L	2.250	0.000	77.602	0.000	72.5	-3.3	-0.081
0.50L	1.500	0.000	77.602	0.000	72.6	-2.3	-0.081
0.25L	0.750	0.000	77.602	0.000	72.8	-1.2	-0.081
Jt. 2	0.000	0.000	77.602	0.000	72.9	-0.1	-0.081

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 2

Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 2 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	3.000	0.000	-3.398	0.000	70.4	-0.3	0.059
0.75L	2.250	0.000	-3.398	0.000	70.4	-1.1	0.059
0.50L	1.500	0.000	-3.398	0.000	70.4	-1.9	0.059
0.25L	0.750	0.000	-3.398	0.000	70.4	-2.7	0.059
Jt. 12	0.000	0.000	-3.398	0.000	70.4	-3.4	0.059

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 12
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 12

RESULTS FOR COMBINATION 2 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	3.000	0.000	-45.528	0.000	69.5	-4.2	-0.078
0.75L	2.250	0.000	-45.528	0.000	69.4	-3.1	-0.078
0.50L	1.500	0.000	-45.528	0.000	69.3	-2.1	-0.078
0.25L	0.750	0.000	-45.528	0.000	69.2	-1.1	-0.078
Jt. 1	0.000	0.000	-45.528	0.000	69.0	-0.1	-0.078

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 1

RESULTS FOR COMBINATION 2 MEMBER 8

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	3.000	0.000	-65.778	0.000	70.2	-6.6	-0.047
0.75L	2.250	0.000	-65.778	0.000	70.0	-6.0	-0.047
0.50L	1.500	0.000	-65.778	0.000	69.9	-5.4	-0.047
0.25L	0.750	0.000	-65.778	0.000	69.7	-4.8	-0.047
Jt. 3	0.000	0.000	-65.778	0.000	69.5	-4.2	-0.047

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 3
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 3

RESULTS FOR COMBINATION 2 MEMBER 9

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	3.000	0.000	-69.828	0.000	70.9	-7.1	-0.009
0.75L	2.250	0.000	-69.828	0.000	70.7	-7.0	-0.009
0.50L	1.500	0.000	-69.828	0.000	70.6	-6.9	-0.009
0.25L	0.750	0.000	-69.828	0.000	70.4	-6.8	-0.009
Jt. 5	0.000	0.000	-69.828	0.000	70.2	-6.6	-0.009

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 5
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 5

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RESULTS FOR COMBINATION 2 MEMBER 10

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 9	3.000	0.000	-29.328	0.000	71.2	-5.6	0.029
0.75L	2.250	0.000	-29.328	0.000	71.1	-6.0	0.029
0.50L	1.500	0.000	-29.328	0.000	71.1	-6.4	0.029
0.25L	0.750	0.000	-29.328	0.000	71.0	-6.7	0.029
Jt. 7	0.000	0.000	-29.328	0.000	70.9	-7.1	0.029

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 7

RESULTS FOR COMBINATION 2 MEMBER 11

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 11	3.000	0.000	15.222	0.000	71.1	-2.8	0.053
0.75L	2.250	0.000	15.222	0.000	71.1	-3.5	0.053
0.50L	1.500	0.000	15.222	0.000	71.1	-4.2	0.053
0.25L	0.750	0.000	15.222	0.000	71.2	-4.9	0.053
Jt. 9	0.000	0.000	15.222	0.000	71.2	-5.6	0.053

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 9
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 9

RESULTS FOR COMBINATION 2 MEMBER 12

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 13	3.000	0.000	75.972	0.000	70.3	-0.2	0.049
0.75L	2.250	0.000	75.972	0.000	70.5	-0.9	0.049
0.50L	1.500	0.000	75.972	0.000	70.7	-1.5	0.049
0.25L	0.750	0.000	75.972	0.000	70.9	-2.2	0.049
Jt. 11	0.000	0.000	75.972	0.000	71.1	-2.8	0.049

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 11
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 11

RESULTS FOR COMBINATION 2 MEMBER 13

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	3.000	-57.352	28.350	0.000	72.9	-0.1	90.019
0.75L	2.250	-52.852	28.350	41.327	73.1	-0.1	90.001
0.50L	1.500	-48.352	28.350	79.278	72.8	-0.1	89.947
0.25L	0.750	-43.852	28.350	113.855	71.6	-0.1	89.861
Jt. 1	0.000	-39.352	28.350	145.057	69.0	-0.1	89.747

RESULTS FOR COMBINATION 2 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	0.000	81.652	0.000	71.7	-6.7	-0.044
0.75L	2.250	0.000	81.652	0.000	71.9	-6.1	-0.044
0.50L	1.500	0.000	81.652	0.000	72.0	-5.5	-0.044
0.25L	0.750	0.000	81.652	0.000	72.2	-4.9	-0.044
Jt. 4	0.000	0.000	81.652	0.000	72.3	-4.4	-0.044

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 2 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	0.000	69.502	0.000	71.2	-7.3	-0.012
0.75L	2.250	0.000	69.502	0.000	71.3	-7.1	-0.012
0.50L	1.500	0.000	69.502	0.000	71.5	-7.0	-0.012
0.25L	0.750	0.000	69.502	0.000	71.6	-6.8	-0.012
Jt. 6	0.000	0.000	69.502	0.000	71.7	-6.7	-0.012

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 6
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 6

RESULTS FOR COMBINATION 2 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 10	3.000	0.000	69.502	0.000	70.7	-6.1	0.024
0.75L	2.250	0.000	69.502	0.000	70.8	-6.4	0.024
0.50L	1.500	0.000	69.502	0.000	70.9	-6.7	0.024
0.25L	0.750	0.000	69.502	0.000	71.1	-7.0	0.024
Jt. 8	0.000	0.000	69.502	0.000	71.2	-7.3	0.024

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 8
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 8

RESULTS FOR COMBINATION 2 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	0.000	41.152	0.000	70.4	-3.4	0.050
0.75L	2.250	0.000	41.152	0.000	70.4	-4.1	0.050
0.50L	1.500	0.000	41.152	0.000	70.5	-4.7	0.050
0.25L	0.750	0.000	41.152	0.000	70.6	-5.4	0.050
Jt. 10	0.000	0.000	41.152	0.000	70.7	-6.1	0.050

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 10
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 10

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Maximum +ve Bending Moment      145.057 kN.m at     0.000m from joint  1
Maximum -ve Bending Moment        0.000 kN.m at     3.000m from joint  1
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RESULTS FOR COMBINATION 2 MEMBER 14

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.000	0.000	20.250	0.000	72.3	-4.4	89.946
0.75L	2.250	0.000	20.250	0.000	71.6	-4.3	89.946
0.50L	1.500	0.000	20.250	0.000	70.9	-4.3	89.946
0.25L	0.750	0.000	20.250	0.000	70.2	-4.2	89.946
Jt. 3	0.000	0.000	20.250	0.000	69.5	-4.2	89.946

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Maximum +ve Bending Moment        0.000 kN.m at     3.000m from joint  3
Maximum -ve Bending Moment        0.000 kN.m at     0.000m from joint  3
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RESULTS FOR COMBINATION 2 MEMBER 15

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	0.000	4.050	0.000	71.7	-6.7	89.971
0.75L	2.250	0.000	4.050	0.000	71.3	-6.7	89.971
0.50L	1.500	0.000	4.050	0.000	71.0	-6.7	89.971
0.25L	0.750	0.000	4.050	0.000	70.6	-6.6	89.971
Jt. 5	0.000	0.000	4.050	0.000	70.2	-6.6	89.971

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Maximum +ve Bending Moment        0.000 kN.m at     0.000m from joint  5
Maximum -ve Bending Moment        0.000 kN.m at     3.000m from joint  5
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RESULTS FOR COMBINATION 2 MEMBER 16

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	3.000	0.000	16.200	0.000	71.2	-7.3	89.995
0.75L	2.250	0.000	16.200	0.000	71.1	-7.3	89.995
0.50L	1.500	0.000	16.200	0.000	71.1	-7.2	89.995
0.25L	0.750	0.000	16.200	0.000	71.0	-7.2	89.995
Jt. 7	0.000	0.000	16.200	0.000	70.9	-7.1	89.995

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Maximum +ve Bending Moment        0.000 kN.m at     3.000m from joint  7
Maximum -ve Bending Moment        0.000 kN.m at     0.000m from joint  7
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RESULTS FOR COMBINATION 2 MEMBER 17

Position (m)	Shear Force	Axial Comp.	Bend.Moment	dx	dy	Slope

from End 1		(kN)	(kN)	(kN.m)	(mm)	(mm)	(deg)
Jt. 10	3.000	0.000	44.550	0.000	70.7	-6.1	90.011
0.75L	2.250	0.000	44.550	0.000	70.8	-5.9	90.011
0.50L	1.500	0.000	44.550	0.000	70.9	-5.8	90.011
0.25L	0.750	0.000	44.550	0.000	71.1	-5.7	90.011
Jt. 9	0.000	0.000	44.550	0.000	71.2	-5.6	90.011

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 9
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 9

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===============================================================================
*                             *                             * JOB : COLT
*-----------------------------*-----------------------------*-----------------
*                             *                             * DATE:
*                             *                             *-----------------
*                             * A N A L Y S I S  R E S U L T S *SHEET:     21
*-----------------------------------------------------------------------------
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RESULTS FOR COMBINATION 2 MEMBER 18

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 12	3.000	0.000	60.750	0.000	70.4	-3.4	90.013
0.75L	2.250	0.000	60.750	0.000	70.5	-3.3	90.013
0.50L	1.500	0.000	60.750	0.000	70.7	-3.1	90.013
0.25L	0.750	0.000	60.750	0.000	70.9	-3.0	90.013
Jt. 11	0.000	0.000	60.750	0.000	71.1	-2.8	90.013

Maximum +ve Bending Moment 0.000 kN.m at 3.000m from joint 11
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 11

RESULTS FOR COMBINATION 2 MEMBER 19

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	3.000	-64.148	68.850	0.000	70.4	-0.3	90.107
0.75L	2.250	-61.898	68.850	47.267	71.7	-0.3	90.086
0.50L	1.500	-59.648	68.850	92.847	72.5	-0.3	90.024
0.25L	0.750	-57.398	68.850	136.739	72.2	-0.3	89.923
Jt. 13	0.000	-55.148	68.850	178.943	70.3	-0.2	89.783

Maximum +ve Bending Moment 178.943 kN.m at 0.000m from joint 13
Maximum -ve Bending Moment 0.000 kN.m at 3.000m from joint 13

RESULTS FOR COMBINATION 2 MEMBER 20

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment .(kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.243	0.000	-28.638	0.000	69.5	-4.2	-45.071
0.75L	3.182	0.000	-28.638	0.000	70.4	-3.2	-45.071
0.50L	2.121	0.000	-28.638	0.000	71.2	-2.2	-45.071
0.25L	1.061	0.000	-28.638	0.000	72.1	-1.1	-45.071
Jt. 2	0.000	0.000	-28.638	0.000	72.9	-0.1	-45.071

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 2
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 2 MEMBER 21

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	4.243	0.000	-5.728	0.000	70.2	-6.6	-45.042
0.75L	3.182	0.000	-5.728	0.000	70.7	-6.1	-45.042
0.50L	2.121	0.000	-5.728	0.000	71.3	-5.5	-45.042
0.25L	1.061	0.000	-5.728	0.000	71.8	-4.9	-45.042
Jt. 4	0.000	0.000	-5.728	0.000	72.3	-4.4	-45.042

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 2 MEMBER 22

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 7	4.243	0.000	17.183	0.000	70.9	-7.1	-45.012
0.75L	3.182	0.000	17.183	0.000	71.1	-7.0	-45.012
0.50L	2.121	0.000	17.183	0.000	71.3	-6.9	-45.012
0.25L	1.061	0.000	17.183	0.000	71.5	-6.8	-45.012
Jt. 6	0.000	0.000	17.183	0.000	71.7	-6.7	-45.012

Maximum +ve Bending Moment 0.000 kN.m at 4.243m from joint 6
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 6

RESULTS FOR COMBINATION 2 MEMBER 23

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 10	4.243	0.000	-40.093	0.000	70.7	-6.1	45.013
0.75L	3.182	0.000	-40.093	0.000	70.7	-6.3	45.013
0.50L	2.121	0.000	-40.093	0.000	70.8	-6.6	45.013
0.25L	1.061	0.000	-40.093	0.000	70.9	-6.9	45.013
Jt. 7	0.000	0.000	-40.093	0.000	70.9	-7.1	45.013

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 7

RESULTS FOR COMBINATION 2 MEMBER 24

Position (m) from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)

Jt. 12	4.243	0.000	-63.003	0.000	70.4	-3.4	45.029
0.75L	3.182	0.000	-63.003	0.000	70.6	-4.0	45.029
0.50L	2.121	0.000	-63.003	0.000	70.8	-4.5	45.029
0.25L	1.061	0.000	-63.003	0.000	71.0	-5.1	45.029
Jt. 9	0.000	0.000	-63.003	0.000	71.2	-5.6	45.029

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 9
Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 9

RESULTS FOR COMBINATION 2 MEMBER 25

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 14	4.243	0.000	-85.913	0.000	70.4	-0.3	45.030
0.75L	3.182	0.000	-85.913	0.000	70.6	-1.0	45.030
0.50L	2.121	0.000	-85.913	0.000	70.7	-1.6	45.030
0.25L	1.061	0.000	-85.913	0.000	70.9	-2.2	45.030
Jt. 11	0.000	0.000	-85.913	0.000	71.1	-2.8	45.030

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 11
Maximum -ve Bending Moment 0.000 kN.m at 4.243m from joint 11

		JOB : COLT
		DATE:
	ANALYSIS RESULTS	SHEET: 23

RESULTS FOR COMBINATION 2 MEMBER 26

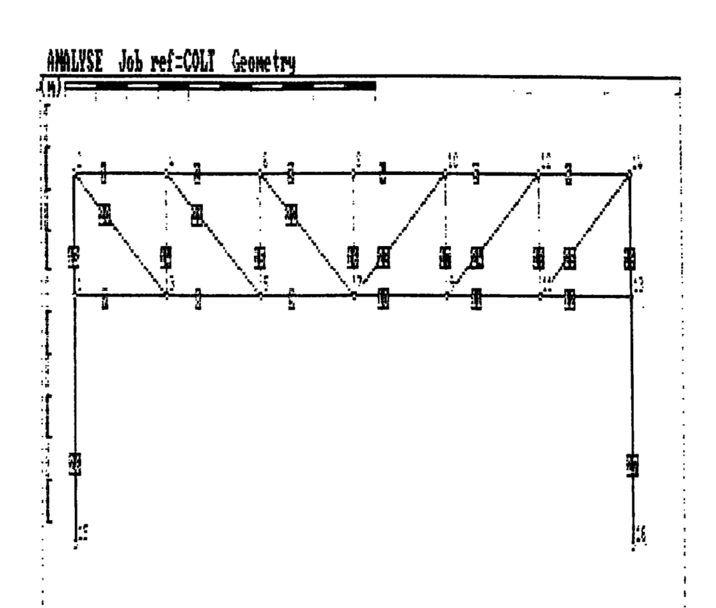
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 1	6.000	6.176	28.350	145.057	69.0	-0.1	89.747
0.75L	4.500	15.176	28.350	129.043	59.1	-0.1	89.502
0.50L	3.000	24.176	28.350	99.528	43.3	0.0	89.298
0.25L	1.500	33.176	28.350	56.514	22.9	0.0	89.158
Jt. 15	0.000	42.176	28.350	0.000	0.0	0.0	89.106

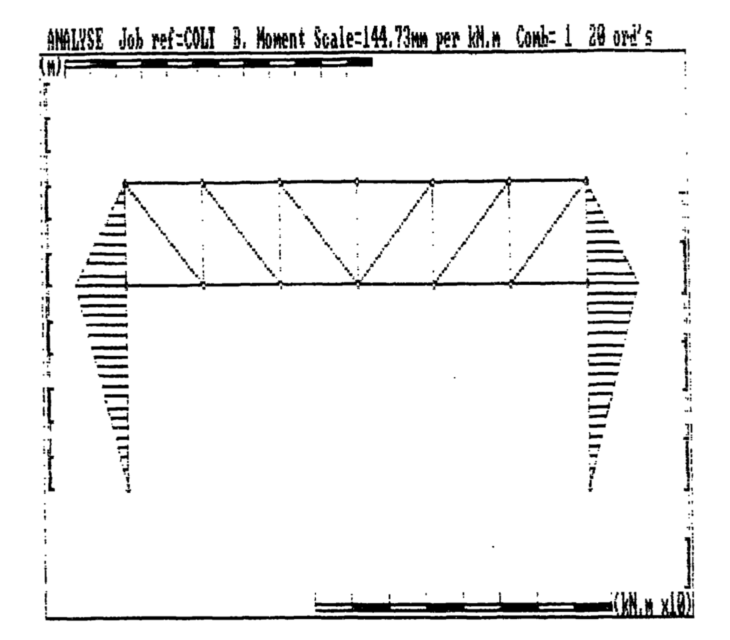
Maximum +ve Bending Moment 145.057 kN.m at 6.000m from joint 15
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 15

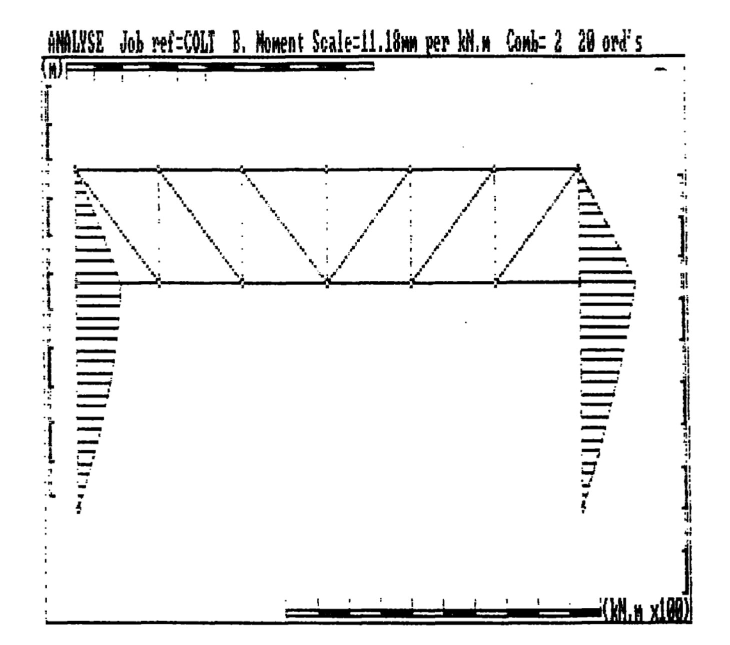
RESULTS FOR COMBINATION 2 MEMBER 27

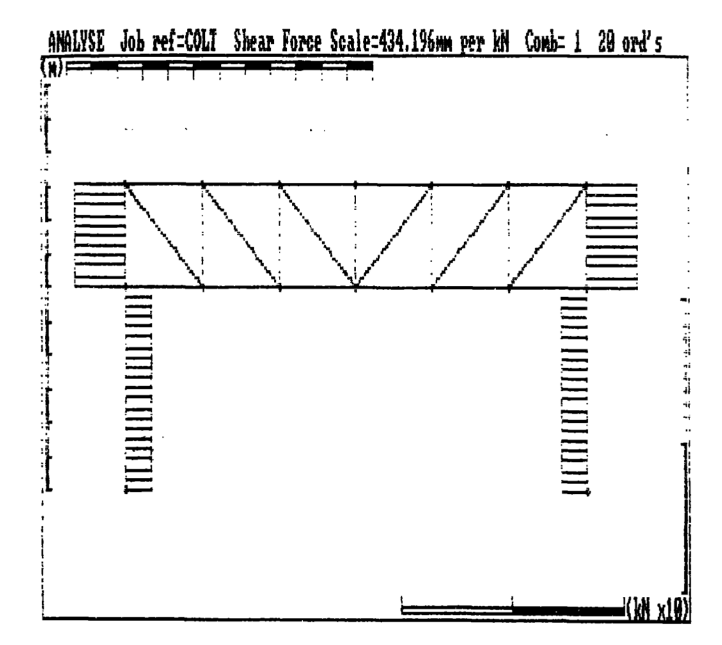
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 13	6.000	20.824	68.850	178.943	70.3	-0.2	89.783
0.75L	4.500	25.324	68.850	144.332	60.7	-0.2	89.496
0.50L	3.000	29.824	68.850	102.972	44.5	-0.1	89.276
0.25L	1.500	34.324	68.850	54.861	23.5	-0.1	89.136
Jt. 16	0.000	38.824	68.850	0.000	0.0	0.0	89.086

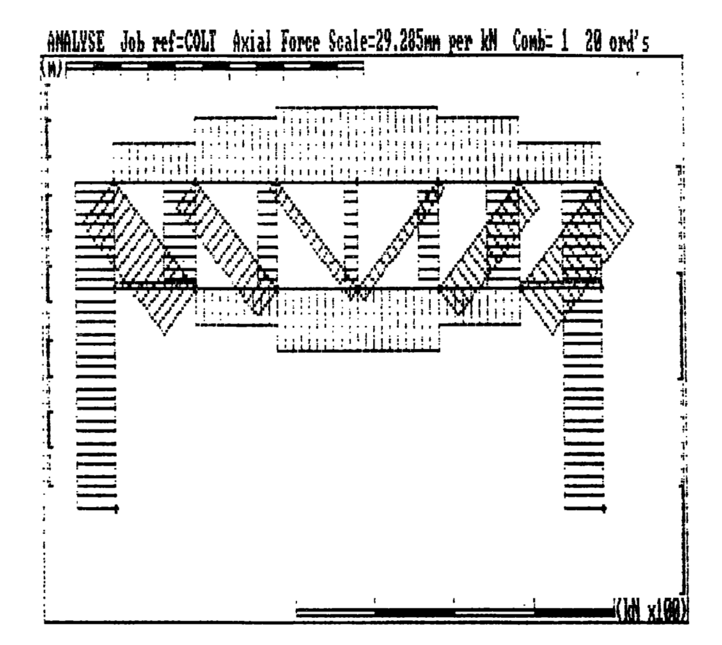
Maximum +ve Bending Moment 178.943 kN.m at 6.000m from joint 16

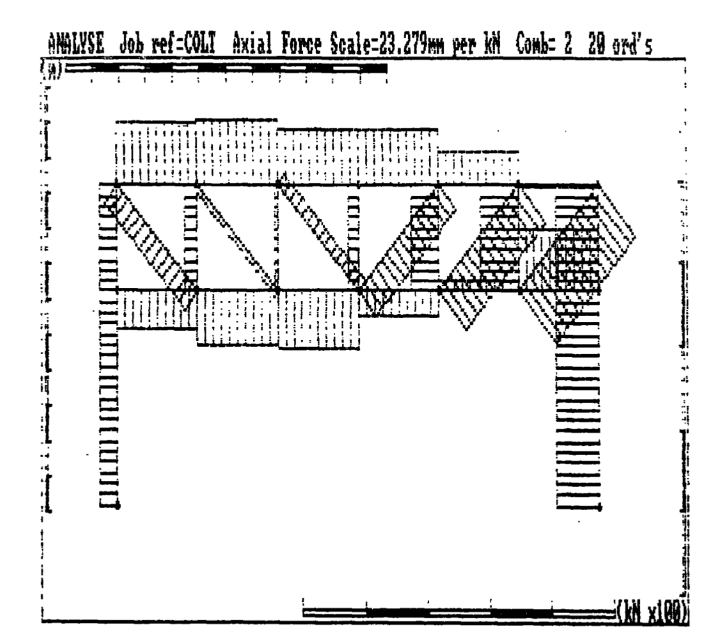

ANALYSE Job ref=COLT Geometry


ANALYSE Job ref=COLI B. Moment Scale=144.73mm per kN.m Comb= 1 20 ord's
(m)
(kN.m x10)

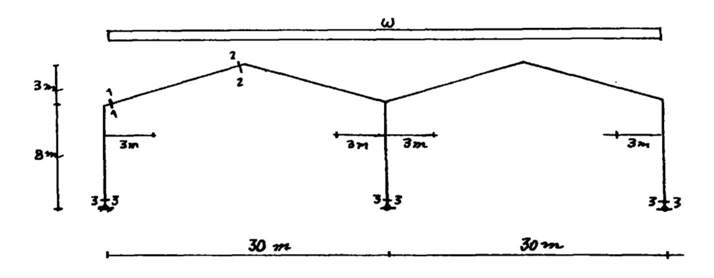

ANALYSE Job ref=COLT B. Moment Scale=11.18mm per kN.m Comb= 2 20 ord's
(m)
(kN.m x100)


ANALYSE Job ref=COLT Shear Force Scale=434.196mm per kN Comb= 1 20 ord's
(m)
(kN x10)


ANALYSE Job ref=COLT Axial Force Scale=29.285mm per kN Comb= 1 20 ord's
(m)
(kN x100)


ANALYSE Job ref=COLT Axial Force Scale=23.279mm per kN Comb= 2 20 ord's
(m)
(kN x100)

مثال : كما بالرسم اطار هيكلى حديدى (Frame) وعليه الأحمال الموضحة بالرسم



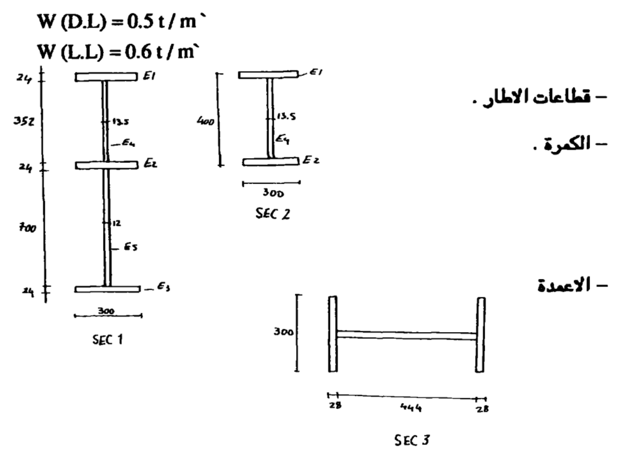
W (D.L) = 0.5 t / m`

W (L.L) = 0.6 t / m`

– قطاعات الاطار .

– الكمرة .

– الاعمدة



– تظهر بيانات ونتائج المنشأ كالاتي :

		* JOB : SFRAME
		* DATE:
	I N P U T D A T A	*SHEET: 1

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FRAME GEOMETRY

No. of Joints = 8

MEMBERS

Mem No.	Jt. no.	C	End 1 X coord (m)	End 1 Y coord (m)	Jt. no.	C	End 2 X Coord (m)	End 2 Y Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	0.000	8.000	8.000	90.00
2	2	F	0.000	8.000	3	F	15.000	11.000	15.297	11.31
3	3	F	15.000	11.000	5	F	30.000	8.000	15.297	-11.31
4	4	F	30.000	0.000	5	F	30.000	8.000	8.000	90.00
5	5	F	30.000	8.000	6	F	45.000	11.000	15.297	11.31
6	6	F	45.000	11.000	8	F	60.000	8.000	15.297	-11.31
7	7	F	60.000	0.000	8	F	60.000	8.000	8.000	90.00

TABLE OF SECTIONS

Section Number	Area (cm2)	Inertia (cm4)	Rectangular Elements (if specified) No	D (mm)	B (mm)	Y (mm)
1	335.52	538318.5	1	24.00	300.00	376.00
			2	24.00	300.00	0.00
			3	20.00	300.00	-722.00
			4	352.00	13.50	188.00
			5	700.00	12.00	-362.00
2	191.52	55871.1	1	24.00	300.00	376.00
			2	24.00	300.00	0.00
			3	20.00	0.00	0.00
			4	352.00	13.50	188.00
			5	700.00	0.00	0.00
3	232.38	104255.4	1	28.00	300.00	236.00
			2	444.00	14.50	0.00
			3	28.00	300.00	-236.00

SUMMARY OF MEMBER PROPERTIES

Member 1 PRISMATIC : Section Number 3 : Modulus E = 210000.0 N/mm2

Member 2 NON PRISMATIC : Modulus E = 210000.0 N/mm2

Segment 1 Length = 3.000 m: End 1 Section No. = 1 : End 2 Section No. = 2
'' 2 '' 12.297 m: '' '' '' 2 : '' '' '' 2

Member 3 NON PRISMATIC : Modulus E = 210000.0 N/mm2

```
Segment  1 Length = 12.297 m: End 1 Section No. =  2 : End 2 Section No. =  2
   ''    2   ''      3.000 m:  ''       ''      ''     2 :  ''      ''      ''     1
------------------------------------------------------------------------------------
Member 4 PRISMATIC : Section Number  3 : Modulus E =  210000.0 N/mm2
--------------------------( Continued on Next Page )-------------------------


====================================================================================
*                              *                               * JOB : SFRAME
*------------------------------*-------------------------------*-------------------
*                              *                               * DATE:
*                              *                               *-------------------
*                              *      I N P U T   D A T A      *SHEET:      2
*----------------------------------------------------------------------------------
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====================================================================================
SUMMARY OF MEMBER PROPERTIES continued

Member 5 NON PRISMATIC : Modulus E =  210000.0 N/mm2

Segment  1 Length =  3.000 m: End 1 Section No. =  1 : End 2 Section No. =  2
   ''    2   ''     12.297 m:  ''       ''      ''     2 :  ''      ''      ''     2
------------------------------------------------------------------------------------
Member 6 NON PRISMATIC : Modulus E =  210000.0 N/mm2

Segment  1 Length = 12.297 m: End 1 Section No. =  2 : End 2 Section No. =  2
   ''    2   ''      3.000 m:  ''       ''      ''     2 :  ''      ''      ''     1
------------------------------------------------------------------------------------
Member 7 PRISMATIC : Section Number  3 : Modulus E =  210000.0 N/mm2
====================================================================================
SUPPORTS

No. of Supports =  3

  Joint : X Restraint : Y Restraint : Angular Restraint
 Number :   ( kN/mm ) :   ( kN/mm ) :   ( kN.m/radian )
--------:-------------:-------------:--------------------
    1   :    FULL     :    FULL     :       ZERO
    4   :    FULL     :    FULL     :       ZERO
    7   :    FULL     :    FULL     :       ZERO
====================================================================================
APPLIED LOADS AND MOMENTS

MEMBERS 2 - 3

L O A D   C A S E    :LOAD: P O S I T I O N      : L O A D / M O M E N T
No : Name            :Type:    Start:    Length:    Start Value:      End Value
---:-----------------:----:----------:----------:-----------------:----------------
 1:       Dead Load: UV :           :          :    5.000 kN/m:
 2:     LIVE LOAD 1: UV :           :          :    6.000 kN/m:
------------------------------------------------------------------------------------
MEMBERS 5 - 6

L O A D   C A S E    :LOAD: P O S I T I O N      : L O A D / M O M E N T
No : Name            :Type:    Start:    Length:    Start Value:      End Value
---:-----------------:----:----------:----------:-----------------:----------------
 1:       Dead Load: UV :           :          :    5.000 kN/m:
 3:     LIVE LOAD 2: UV :           :          :    6.000 kN/m:
====================================================================================
```

COMBINATIONS

```
                      : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E     : Combination Number
No : Name             :  1  :  2  :  3
----------------------:-----:-----:-----
  1:       Dead Load:1.000:1.000:1.000
  2:     LIVE LOAD 1:1.000:     :1.000
  3:     LIVE LOAD 2:     :1.000:1.000
=========================================================================
```

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=========================================================================
*                         *                                  * JOB : SFRAME
*-------------------------*----------------------------------*--------------
*                         *                                  * DATE:
*                         *                                  *--------------
*                         * A N A L Y S I S   R E S U L T S  *SHEET:    3
*---------------------------------------------------------------------------
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RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0082	87.393	162.526	0.000
2	-31.57	-0.27	-0.0046			
3	-6.61	-126.90	0.0008			
4	0.00	0.00	-0.0046	-47.285	244.948	0.000
5	18.31	-0.40	0.0023			
6	24.99	-34.65	-0.0008			
7	0.00	0.00	-0.0059	-40.108	72.526	0.000
8	31.73	-0.12	-0.0001			

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-480.000	-11700.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-480.000	-11700.000
Summation	0.000	480.000	11700.000
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 2

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0059	40.108	72.526	0.000
2	-31.73	-0.12	0.0001			
3	-24.99	-34.65	0.0008			
4	0.00	0.00	0.0046	47.285	244.948	0.000
5	-18.31	-0.40	-0.0023			
6	6.61	-126.90	-0.0008			
7	0.00	0.00	-0.0082	-87.393	162.526	0.000

8	31.57	-0.27	0.0046

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-480.000	-17100.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-480.000	-17100.000
Summation	0.000	480.000	17100.000
Summation	0.000	0.000	0.000

*	*	* JOB : SFRAME
*	*	* DATE:
*	* A N A L Y S I S R E S U L T S	*SHEET: 4

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RESULTS FOR COMBINATION 3

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0097	87.657	161.598	0.000
2	-43.52	-0.26	-0.0031			
3	-21.73	-111.06	0.0010			
4	0.00	0.00	0.0000	0.000	336.803	0.000
5	0.00	-0.55	0.0000			
6	21.73	-111.06	-0.0010			
7	0.00	0.00	-0.0097	-87.657	161.598	0.000
8	43.51	-0.26	0.0031			

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-660.000	-19800.000
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-660.000	-19800.000
Summation	0.000	660.000	19800.000
Summation	0.000	0.000	0.000

Maxima for Member 1

Load	Shear (kN)	Maximum Axial (kN)		<------- Bending Moment (kN.m) -------:			
Comb.	(Abs. Max.)	(Compression)	(Tension)	Max.+ve	Pos. (m)	Max.-ve	Pos. (m
1	-87.393	162.526	0.000	0.000	0.000	-699.147	8.00
2	-40.108	72.526	0.000	0.000	0.000	-320.866	8.00

3	-87.657	161.598	0.000	0.000	0.000	-701.259	8.000

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	142.231	117.570	0.000	257.159	13.447	-699.147	0.000
2	63.252	53.553	0.000	95.217	13.156	-320.866	0.000
3	141.269	117.647	0.000	242.163	13.356	-701.259	0.000

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-147.082	118.541	0.000	249.297	1.391	-773.365	15.29
2	-68.104	54.523	0.000	87.279	1.132	-395.082	15.29
3	-147.940	118.981	0.000	231.320	1.310	-803.307	15.29

Maxima for Member 4

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	47.285	244.948	0.000	378.282	8.000	0.000	0.000
2	-47.285	244.948	0.000	0.000	0.000	-378.282	8.000
3	0.000	336.803	0.000	0.000	8.000	0.000	0.000

Maxima for Member 5

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	68.104	54.523	0.000	87.279	14.166	-395.083	0.000
2	147.082	118.541	0.000	249.297	13.906	-773.364	0.000
3	147.940	118.981	0.000	231.320	13.987	-803.307	0.000

Maxima for Member 6

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	-63.252	53.553	0.000	95.217	2.141	-320.865	15.29
2	-142.231	117.570	0.000	257.159	1.850	-699.148	15.29
3	-141.269	117.647	0.000	242.163	1.941	-701.259	15.29

Maxima for Member 7

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) -------> Max.+ve	Pos. (m)	Max.-ve	Pos. (m)
1	40.108	72.526	0.000	320.865	8.000	0.000	0.000
2	87.393	162.526	0.000	699.148	8.000	0.000	0.000
3	87.657	161.598	0.000	701.259	8.000	0.000	0.000

RESULTS FOR COMBINATION 1 MEMBER 1

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	8.000	-87.393	162.526	-699.147	-31.6	-0.3	89.738
0.75L	6.000	-87.393	162.526	-524.361	-34.9	-0.2	90.058
0.50L	4.000	-87.393	162.526	-349.574	-28.6	-0.1	90.287
0.25L	2.000	-87.393	162.526	-174.787	-15.9	-0.1	90.424
Jt. 1	0.000	-87.393	162.526	0.000	0.0	0.0	90.470

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -699.147 kN.m at 8.000m from joint 1

		JOB : SFRAME
		DATE:
	A N A L Y S I S R E S U L T S	SHEET: 6

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RESULTS FOR COMBINATION 1 MEMBER 2

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	15.297	-19.565	85.211	239.064	-6.6	-126.9	11.354
0.75L	11.473	20.884	93.301	236.542	-9.0	-114.4	10.886
0.50L	7.649	61.333	101.391	79.333	-16.9	-74.6	10.566
0.25L	3.824	101.782	109.480	-232.563	-26.4	-26.6	10.685
Jt. 2	0.000	142.231	117.570	-699.147	-31.6	-0.3	11.048

Maximum +ve Bending Moment 257.159 kN.m at 13.447m from joint 2
Maximum -ve Bending Moment -699.147 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 3

Position (m)	from End 1	Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	15.297	-147.082	118.541	-773.365	18.3	-0.4	-11.177
0.75L	11.473	-106.633	110.451	-288.227	14.6	-19.6	-10.754

0.50L	7.649	-66.185	102.361	42.224	5.4	-66.1	-10.548
0.25L	3.824	-25.736	94.271	217.988	-3.1	-109.1	-10.815
Jt. 3	0.000	14.713	86.181	239.064	-6.6	-126.9	-11.266

Maximum +ve Bending Moment 249.297 kN.m at 1.391m from joint 3
Maximum -ve Bending Moment -773.365 kN.m at 15.297m from joint 3

RESULTS FOR COMBINATION 1 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	8.000	47.285	244.948	378.282	18.3	-0.4	90.133
0.75L	6.000	47.285	244.948	283.712	19.8	-0.3	89.960
0.50L	4.000	47.285	244.948	189.141	16.1	-0.2	89.836
0.25L	2.000	47.285	244.948	94.571	8.9	-0.1	89.762
Jt. 4	0.000	47.285	244.948	0.000	0.0	0.0	89.737

Maximum +ve Bending Moment 378.282 kN.m at 8.000m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 1 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	15.297	-5.440	39.814	84.202	25.0	-34.6	11.266
0.75L	11.473	12.946	43.492	69.849	23.4	-26.6	11.112
0.50L	7.649	31.332	47.169	-14.816	20.3	-10.7	11.049
0.25L	3.824	49.718	50.846	-169.793	17.7	2.7	11.211
Jt. 5	0.000	68.104	54.523	-395.083	18.3	-0.4	11.443

Maximum +ve Bending Moment 87.279 kN.m at 14.166m from joint 5
Maximum -ve Bending Moment -395.083 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 1 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	15.297	-63.252	53.553	-320.865	31.7	-0.1	-11.313
0.75L	11.473	-44.866	49.876	-114.130	30.9	-4.2	-11.142
0.50L	7.649	-26.480	46.198	22.293	28.0	-19.1	-11.067
0.25L	3.824	-8.094	42.521	88.404	25.5	-31.9	-11.181
Jt. 6	0.000	10.292	38.844	84.202	25.0	-34.6	-11.353

Maximum +ve Bending Moment 95.217 kN.m at 2.141m from joint 6
Maximum -ve Bending Moment -320.865 kN.m at 15.297m from joint 6

RESULTS FOR COMBINATION 1 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	8.000	40.108	72.526	320.865	31.7	-0.1	89.997
0.75L	6.000	40.108	72.526	240.649	28.9	-0.1	89.850
0.50L	4.000	40.108	72.526	160.433	21.7	-0.1	89.745
0.25L	2.000	40.108	72.526	80.216	11.6	0.0	89.682
Jt. 7	0.000	40.108	72.526	0.000	0.0	0.0	89.661

Maximum +ve Bending Moment 320.865 kN.m at 8.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 7

RESULTS FOR COMBINATION 2 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	8.000	-40.108	72.526	-320.866	-31.7	-0.1	90.003
0.75L	6.000	-40.108	72.526	-240.649	-28.9	-0.1	90.150
0.50L	4.000	-40.108	72.526	-160.433	-21.7	-0.1	90.255
0.25L	2.000	-40.108	72.526	-80.216	-11.6	0.0	90.318
Jt. 1	0.000	-40.108	72.526	0.000	0.0	0.0	90.339

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -320.866 kN.m at 8.000m from joint 1

RESULTS FOR COMBINATION 2 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	15.297	-10.292	38.844	84.201	-25.0	-34.6	11.353
0.75L	11.473	8.094	42.521	88.403	-25.5	-31.9	11.181
0.50L	7.649	26.480	46.199	22.293	-28.0	-19.1	11.067
0.25L	3.824	44.866	49.876	-114.130	-30.9	-4.2	11.142
Jt. 2	0.000	63.252	53.553	-320.866	-31.7	-0.1	11.313

Maximum +ve Bending Moment 95.217 kN.m at 13.156m from joint 2
Maximum -ve Bending Moment -320.866 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 2 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	15.297	-68.104	54.523	-395.082	-18.3	-0.4	-11.443
0.75L	11.473	-49.718	50.846	-169.792	-17.7	2.7	-11.211
0.50L	7.649	-31.332	47.169	-14.815	-20.3	-10.7	-11.049

0.25L	3.824	-12.946	43.492	69.849	-23.4	-26.6	-11.112
Jt. 3	0.000	5.440	39.815	84.201	-25.0	-34.6	-11.266

Maximum +ve Bending Moment 87.279 kN.m at 1.132m from joint 3
Maximum -ve Bending Moment -395.082 kN.m at 15.297m from joint 3

RESULTS FOR COMBINATION 2 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	8.000	-47.285	244.948	-378.282	-18.3	-0.4	89.867
0.75L	6.000	-47.285	244.948	-283.712	-19.8	-0.3	90.040
0.50L	4.000	-47.285	244.948	-189.141	-16.1	-0.2	90.164
0.25L	2.000	-47.285	244.948	-94.571	-8.9	-0.1	90.238
Jt. 4	0.000	-47.285	244.948	0.000	0.0	0.0	90.263

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 4
Maximum -ve Bending Moment -378.282 kN.m at 8.000m from joint 4

RESULTS FOR COMBINATION 2 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	15.297	-14.713	86.182	239.064	6.6	-126.9	11.266
0.75L	11.473	25.736	94.271	217.988	3.1	-109.1	10.815
0.50L	7.649	66.184	102.361	42.225	-5.4	-66.1	10.548
0.25L	3.824	106.633	110.451	-288.226	-14.6	-19.6	10.754
Jt. 5	0.000	147.082	118.541	-773.364	-18.3	-0.4	11.177

Maximum +ve Bending Moment 249.297 kN.m at 13.906m from joint 5
Maximum -ve Bending Moment -773.364 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 2 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	15.297	-142.231	117.570	-699.148	31.6	-0.3	-11.048
0.75L	11.473	-101.782	109.481	-232.564	26.4	-26.6	-10.685
0.50L	7.649	-61.333	101.391	79.333	16.9	-74.6	-10.566
0.25L	3.824	-20.884	93.301	236.542	9.0	-114.4	-10.886
Jt. 6	0.000	19.565	85.211	239.064	6.6	-126.9	-11.354

Maximum +ve Bending Moment 257.159 kN.m at 1.850m from joint 6
Maximum -ve Bending Moment -699.148 kN.m at 15.297m from joint 6

RESULTS FOR COMBINATION 2 MEMBER 7

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 8	8.000	87.393	162.526	699.148	31.6	-0.3	90.262
0.75L	6.000	87.393	162.526	524.361	34.9	-0.2	89.942
0.50L	4.000	87.393	162.526	349.574	28.6	-0.1	89.713
0.25L	2.000	87.393	162.526	174.787	15.9	-0.1	89.576
Jt. 7	0.000	87.393	162.526	0.000	0.0	0.0	89.530

Maximum +ve Bending Moment 699.148 kN.m at 8.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 7

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RESULTS FOR COMBINATION 3 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	8.000	-87.657	161.598	-701.259	-43.5	-0.3	89.822
0.75L	6.000	-87.657	161.598	-525.944	-43.8	-0.2	90.143
0.50L	4.000	-87.657	161.598	-350.630	-34.6	-0.1	90.373
0.25L	2.000	-87.657	161.598	-175.315	-18.9	-0.1	90.510
Jt. 1	0.000	-87.657	161.598	0.000	0.0	0.0	90.556

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -701.259 kN.m at 8.000m from joint 1

RESULTS FOR COMBINATION 3 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	15.297	-20.527	85.288	222.245	-21.7	-111.1	11.370
0.75L	11.473	19.922	93.378	223.400	-23.7	-100.6	10.930
0.50L	7.649	60.371	101.468	69.868	-30.9	-64.4	10.632
0.25L	3.824	100.820	109.557	-238.352	-39.4	-21.2	10.765
Jt. 2	0.000	141.269	117.647	-701.259	-43.5	-0.3	11.132

Maximum +ve Bending Moment 242.163 kN.m at 13.356m from joint 2
Maximum -ve Bending Moment -701.259 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 3 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 5	15.297	-147.940	118.981	-803.307	0.0	-0.6	-11.310
0.75L	11.473	-107.491	110.892	-314.888	-2.1	-11.7	-10.859
0.50L	7.649	-67.042	102.802	18.844	-10.3	-52.8	-10.607
0.25L	3.824	-26.593	94.712	197.888	-18.3	-93.2	-10.834
Jt. 3	0.000	13.855	86.622	222.245	-21.7	-111.1	-11.250

Maximum +ve Bending Moment 231.320 kN.m at 1.310m from joint 3
Maximum -ve Bending Moment -803.307 kN.m at 15.297m from joint 3

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*                                 *                               *---------------
*                                 * A N A L Y S I S   R E S U L T S *SHEET:    10
*-------------------------------------------------------------------------------
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RESULTS FOR COMBINATION  3  MEMBER  4

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy   Slope
    from End 1         (kN)         (kN)       (kN.m)    (mm)      (mm)   (deg)
Jt. 5    8.000        0.000      336.803        0.000     0.0      -0.6  90.000
0.75L    6.000        0.000      336.803        0.000     0.0      -0.4  90.000
0.50L    4.000        0.000      336.803        0.000     0.0      -0.3  90.000
0.25L    2.000        0.000      336.803        0.000     0.0      -0.1  90.000
Jt. 4    0.000        0.000      336.803        0.000     0.0       0.0  90.000

Maximum +ve Bending Moment       0.000 kN.m at    8.000m from joint  4
Maximum -ve Bending Moment       0.000 kN.m at    0.000m from joint  4
--------------------------------------------------------------------------------
RESULTS FOR COMBINATION  3  MEMBER  5

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy   Slope
    from End 1         (kN)         (kN)       (kN.m)    (mm)      (mm)   (deg)
Jt. 6   15.297      -13.855       86.622      222.245    21.7    -111.1  11.250
0.75L   11.473       26.593       94.712      197.888    18.3     -93.2  10.834
0.50L    7.649       67.042      102.802       18.844    10.3     -52.8  10.607
0.25L    3.824      107.491      110.892     -314.888     2.1     -11.7  10.859
Jt. 5    0.000      147.940      118.981     -803.307     0.0      -0.6  11.310

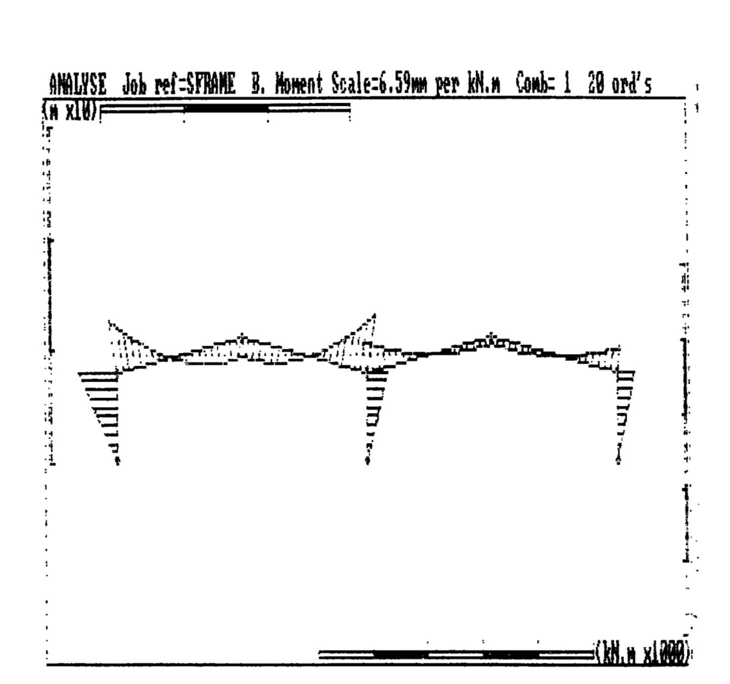
Maximum +ve Bending Moment     231.320 kN.m at   13.987m from joint  5
Maximum -ve Bending Moment    -803.307 kN.m at    0.000m from joint  5
--------------------------------------------------------------------------------
RESULTS FOR COMBINATION  3  MEMBER  6

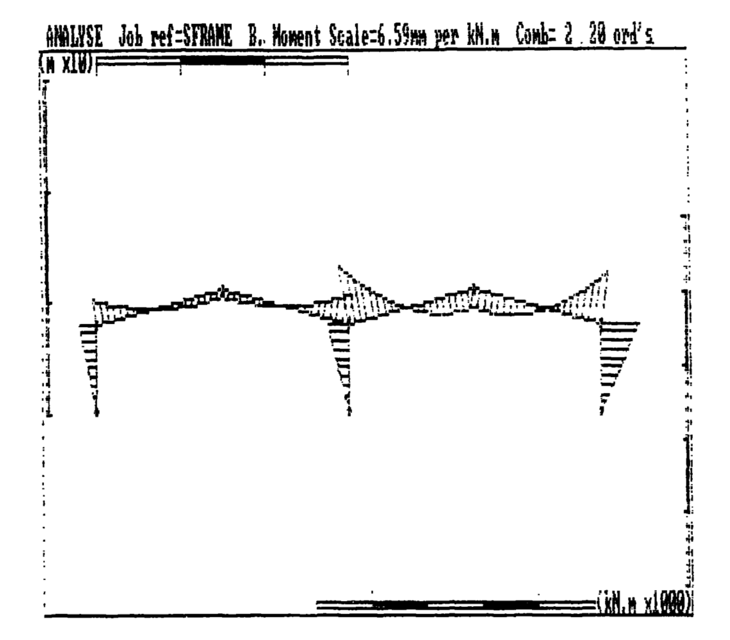
  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy   Slope
    from End 1         (kN)         (kN)       (kN.m)    (mm)      (mm)   (deg)
Jt. 8   15.297     -141.269      117.647     -701.259    43.5      -0.3 -11.132
0.75L   11.473     -100.820      109.557     -238.352    39.4     -21.2 -10.765
0.50L    7.649      -60.371      101.468       69.868    30.9     -64.4 -10.632
0.25L    3.824      -19.922       93.378      223.400    23.7    -100.6 -10.930
Jt. 6    0.000       20.527       85.288      222.245    21.7    -111.1 -11.370

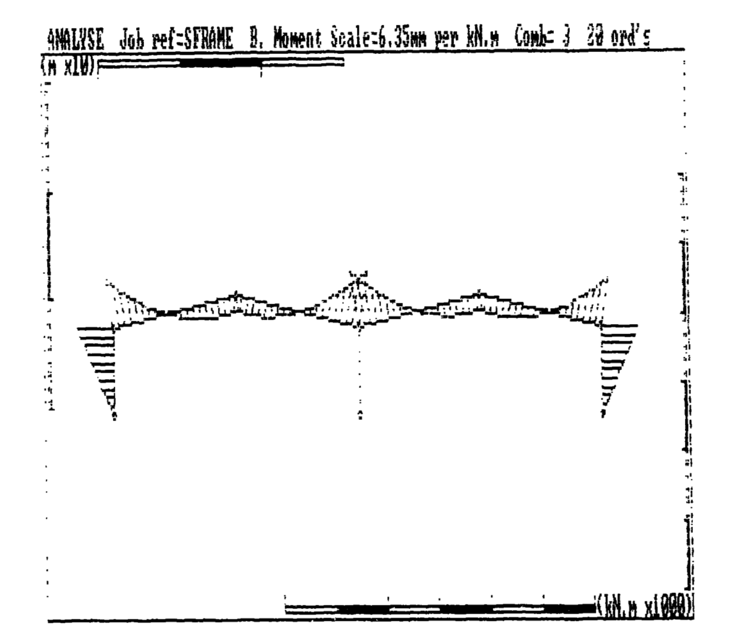
Maximum +ve Bending Moment     242.163 kN.m at    1.941m from joint  6
Maximum -ve Bending Moment    -701.259 kN.m at   15.297m from joint  6
--------------------------------------------------------------------------------
RESULTS FOR COMBINATION  3  MEMBER  7

  Position (m)  Shear Force  Axial Comp.  Bend.Moment      dx        dy   Slope
    from End 1         (kN)         (kN)       (kN.m)    (mm)      (mm)   (deg)
Jt. 8    8.000       87.657      161.598      701.259    43.5      -0.3  90.178
0.75L    6.000       87.657      161.598      525.944    43.8      -0.2  89.857
0.50L    4.000       87.657      161.598      350.629    34.6      -0.1  89.627
0.25L    2.000       87.657      161.598      175.315    18.9      -0.1  89.490
Jt. 7    0.000       87.657      161.598        0.000     0.0       0.0  89.444

Maximum +ve Bending Moment     701.259 kN.m at    8.000m from joint  7
Maximum -ve Bending Moment       0.000 kN.m at    0.000m from joint  7
================================================================================
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ANALYSE Job ref=SFRAME B. Moment Scale=6.59mm per kN.m Comb= 1 20 ord's
(m x10)
(kN.m x1000)


ANALYSE Job ref=SFRAME B. Moment Scale=6.59mm per kN.m Comb= 2 . 20 ord's
(m x10)
(kN.m x1000)


ANALYSE Job ref=SFRAME B. Moment Scale=6.35mm per kN.m Comb= 3 20 ord's
(m x10)
(kN.m x1000)

مثال : كما بالرسم أطار هيكلي حديدى (Frame) وبه ونش متحرك على الأعمدة وعليه الاحمال الموضحة بالرسم

W (D.L) = 0.175 t / m`

W (L.L) = 0.225 t / m`

W1 (W.L) = 0.225 t / m`

W1 (W.R) = - 0.1125 t / m`

W2 (W.L) = 0.1125 t / m`

W2 (W.R) = - 0.225 t / m`

M1 = - 3.825 m.t

M2 = 3.825 m.t

H1 = 1t

H2 = -1 t

قطاع الأعمدة

Sec 1-1 IPE 360

Sec 4-4 IPE 220

قطاع الكمر

Sec 2-2 IPE 300

Sec 3-3 IPE 200

- تظهر بيانات ونتائج المنشأ كالآتى :

		JOB : CRANE
		DATE:
	INPUT DATA	SHEET: 1

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FRAME GEOMETRY

No. of Joints = 7

MEMBERS

Mem: No.	Jt.: no.	C	End 1 Details X coord (m)	End 1 Details Y coord (m)	Jt.: no.	C	End 2 Details X Coord (m)	End 2 Details Y Coord (m)	Length (m)	Slope (deg)
1	1	F	0.000	0.000	2	F	0.000	7.200	7.200	90.00
2	2	F	0.000	7.200	3	F	10.500	7.650	10.510	2.45
3	4	F	10.500	3.250	3	F	10.500	7.650	4.400	90.00
4	5	F	10.500	0.000	4	F	10.500	3.250	3.250	90.00
5	4	P	10.500	3.250	6	F	15.500	3.000	5.006	-2.86
6	7	F	15.500	0.000	6	F	15.500	3.000	3.000	90.00

TABLE OF SECTIONS

Section Number	Area: (cm2)	Inertia: (cm4)	Rectangular Elements (if specified) No:	D (mm)	B (mm)	Y (mm)
1	72.20	17270.0				
2	53.80	8360.0				
3	28.50	1940.0				
4	33.40	2770.0				

SUMMARY OF MEMBER PROPERTIES

Member 1 PRISMATIC : Section Number 1 : Modulus E = 210000.0 N/mm2

Member 2 PRISMATIC : Section Number 2 : Modulus E = 210000.0 N/mm2

Member 3 - 4 PRISMATIC : Section Number 1 : Modulus E = 210000.0 N/mm2

Member 5 PRISMATIC : Section Number 3 : Modulus E = 210000.0 N/mm2

Member 6 PRISMATIC : Section Number 4 : Modulus E = 210000.0 N/mm2

SUPPORTS

No. of Supports = 3

Joint Number	X Restraint (kN/mm)	Y Restraint (kN/mm)	Angular Restraint (kN.m/radian)
1	FULL	FULL	ZERO
5	FULL	FULL	ZERO
7	FULL	FULL	ZERO

		JOB : CRANE
		DATE:
	INPUT DATA	SHEET: 2

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APPLIED LOADS AND MOMENTS

MEMBER 1

LOAD CASE No	Name	LOAD: Type	POSITION Start	Length	LOAD/MOMENT Start Value	End Value
3	windleft	UH			2.250 kN/m	
4	windright	UH			-1.125 kN/m	
5	cleft1	M	5.500 m		-38.250 kN.m	
6	cleft2	PH	5.500 m		10.000 kN	

MEMBER 2

LOAD CASE No	Name	LOAD: Type	POSITION Start	Length	LOAD/MOMENT Start Value	End Value
1	Dead Load	UV			1.750 kN/m	
2	Imposed Load	UV			2.250 kN/m	

MEMBER 3

LOAD CASE No	Name	LOAD: Type	POSITION Start	Length	LOAD/MOMENT Start Value	End Value
3	windleft	UH			1.125 kN/m	
4	windright	UH			-2.250 kN/m	
7	cright1	M	2.250 m		38.250 kN.m	
8	cright2	PH	2.250 m		-10.000 kN	

MEMBER 5

LOAD CASE No	Name	LOAD: Type	POSITION Start	Length	LOAD/MOMENT Start Value	End Value
1	Dead Load	UV			1.750 kN/m	
2	Imposed Load	UV			2.250 kN/m	

MEMBER 6

LOAD CASE No	Name	LOAD: Type	POSITION Start	Length	LOAD/MOMENT Start Value	End Value
3	windleft	UH			1.125 kN/m	
4	windright	UH			-2.250 kN/m	

COMBINATIONS

```
                      : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E     : Combination Number
No : Name             :  1  :  2  :  3  :  4  :  5
----------------------:-----:-----:-----:-----:-----
  1:       Dead Load:1.000:1.000:1.000:     :
---------------------------( Continued on Next Page )--------------------------
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*                            *                                   * JOB : CRANE
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*                            *                                   * DATE:
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*                            *      I N P U T    D A T A         *SHEET:     3
*-------------------------------------------------------------------------------
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COMBINATIONS continued

                      : TABULATED VALUES OF PARTIAL SAFETY FACTORS
L O A D   C A S E     : Combination Number
No : Name             :  1  :  2  :  3  :  4  :  5
----------------------:-----:-----:-----:-----:-----
  2:    Imposed Load:1.000:1.000:1.000:     :
  3:        windleft:     :1.000:     :     :
  4:       windright:     :     :1.000:     :
  5:          cleft1:     :     :     :1.000:
  6:          cleft2:     :     :     :1.000:
  7:         cright1:     :     :     :     :1.000
  8:         cright2:     :     :     :     :1.000
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*	*	* JOB : CRANE
*	*	* DATE:
*	* A N A L Y S I S R E S U L T S	*SHEET: 4

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RESULTS FOR COMBINATION 1

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0018	4.716	21.887	0.000
2	-4.98	-0.10	-0.0016			
3	-5.03	-0.12	0.0023			
4	-0.33	-0.06	0.0003			
5	0.00	0.00	0.0000	-1.849	28.249	0.000
6	-0.36	-0.05	0.0016			
7	0.00	0.00	-0.0006	-2.867	11.864	0.000

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	0.000	-62.000	-480.500
Joint Loads	0.000	0.000	0.000
Reactions	0.000	-62.000	-480.500
Summation	0.000	62.000	480.500
Summation	0.000	0.000	0.000

RESULTS FOR COMBINATION 2

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0076	-8.647	14.718	0.000
2	46.74	-0.07	-0.0053			
3	46.67	-0.15	-0.0017			
4	25.31	-0.07	-0.0072			
5	0.00	0.00	-0.0081	-6.554	32.403	0.000
6	25.26	-0.06	-0.0043			
7	0.00	0.00	-0.0106	-9.324	14.879	0.000

```
--------------------------------------------------------------------------------
Summation of Forces and Moments

                      Px (kN)       Py (kN)     Mo (kN.m)
Member Loads          24.525       -62.000      -570.860
Joint Loads            0.000         0.000         0.000
                    ------------------------------------
Reactions             24.525       -62.000      -570.860
Summation            -24.525        62.000       570.860
                    ------------------------------------
Summation              0.000         0.000         0.000
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*                            *                              * JOB : CRANE
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RESULTS FOR COMBINATION 3

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0109	14.283	29.326	0.000
2	-57.40	-0.14	0.0026			
3	-57.47	-0.09	0.0058			
4	-27.39	-0.05	0.0079			
5	0.00	0.00	0.0087	5.041	23.838	0.000
6	-27.40	-0.04	0.0076			
7	0.00	0.00	0.0101	5.425	8.836	0.000

```
--------------------------------------------------------------------------------
Summation of Forces and Moments

                      Px (kN)       Py (kN)     Mo (kN.m)
Member Loads         -24.750       -62.000      -387.260
Joint Loads            0.000         0.000         0.000
                    ------------------------------------
Reactions            -24.750       -62.000      -387.260
Summation             24.750        62.000       387.260
                    ------------------------------------
Summation              0.000         0.000         0.000
--------------------------------------------------------------------------------
```

RESULTS FOR COMBINATION 4

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	0(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	-0.0076	-2.806	-7.497	0.000

2	48.88	0.04	-0.0042			
3	48.82	-0.03	-0.0040			
4	23.43	-0.01	-0.0069			
5	0.00	0.00	-0.0073	-2.724	4.592	0.000
6	23.40	-0.01	-0.0055			
7	0.00	0.00	-0.0090	-4.470	2.905	0.000

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	10.000	0.000	-93.250
Joint Loads	0.000	0.000	0.000
Reactions	10.000	0.000	-93.250
Summation	-10.000	0.000	93.250
Summation	0.000	0.000	0.000

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*                          *                               * JOB : CRANE
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*                          * A N A L Y S I S   R E S U L T S *SHEET:      6
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RESULTS FOR COMBINATION 5

Joint Displacements and Reactions

Joint No.	dx(mm)	dy(mm)	O(rad)	Px (kN)	Py (kN)	M (kN.m)
1	0.00	0.00	0.0079	5.425	7.584	0.000
2	-47.38	-0.04	0.0040			
3	-47.44	0.03	0.0037			
4	-21.97	0.01	0.0067			
5	0.00	0.00	0.0068	0.385	-4.860	0.000
6	-21.93	0.01	0.0051			
7	0.00	0.00	0.0084	4.190	-2.724	0.000

Summation of Forces and Moments

	Px (kN)	Py (kN)	Mo (kN.m)
Member Loads	-10.000	0.000	93.250
Joint Loads	0.000	0.000	0.000
Reactions	-10.000	0.000	93.250
Summation	10.000	0.000	-93.250
Summation	0.000	0.000	0.000

Maxima for Member 1

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	-------> Pos. (m)
1	-4.716	21.887	0.000	0.000	0.000	-33.958	7.200
2	8.647	14.718	0.000	16.616	3.843	0.000	0.000
3	-14.283	29.326	0.000	0.000	0.000	-73.680	7.200
4	-7.194	0.000	7.497	53.686	5.500	0.000	0.000
5	-5.425	7.584	0.000	0.000	0.000	-39.059	7.200

Maxima for Member 2

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	-------> Pos. (m)
1	21.665	5.649	0.000	24.824	5.426	-33.958	0.000
2	-27.581	8.176	0.000	29.838	3.602	-65.424	10.510
3	29.034	7.433	0.000	31.886	7.272	-73.680	0.000
4	-7.799	6.866	0.000	41.457	0.000	-40.504	10.510
5	7.345	5.745	0.000	38.132	10.510	-39.059	0.000

Maxima for Member 3

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	-------> Pos. (m)
1	4.716	20.113	0.000	26.762	4.400	0.000	0.000
2	12.503	27.282	0.000	65.424	4.400	0.000	0.000
3	6.183	12.674	0.000	0.000	0.000	-19.454	1.652
4	7.194	7.497	0.000	40.504	4.400	0.000	0.000
5	5.425	0.000	7.584	0.000	0.000	-49.795	2.250

Maxima for Member 4

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	-------> Pos. (m)
1	1.849	28.249	0.000	6.010	3.250	0.000	0.000
2	6.554	32.403	0.000	21.301	3.250	0.000	0.000
3	-5.041	23.838	0.000	0.000	0.000	-16.385	3.250
4	2.724	4.592	0.000	8.852	3.250	0.000	0.000
5	-0.385	0.000	4.860	0.000	0.000	-1.251	3.250

Maxima for Member 5

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	-------> Pos. (m)
1	-11.706	3.456	0.000	8.569	2.072	-8.602	5.006
2	-14.563	6.684	0.000	3.670	1.356	-22.908	5.006
3	11.216	1.764	0.000	15.764	2.811	0.000	0.000
4	-2.678	4.609	0.000	0.000	0.000	-13.409	5.006

5	2.511	0.000	4.321	12.571	5.006	0.000	0.000

Maxima for Member 6

Load Comb.	Shear (kN) (Abs. Max.)	Maximum Axial (kN) (Compression)	(Tension)	<------- Bending Moment (kN.m) Max.+ve	Pos. (m)	Max.-ve	-------> Pos. (m)
1	2.867	11.864	0.000	8.602	3.000	0.000	0.000
2	9.324	14.879	0.000	22.908	3.000	0.000	0.000
3	-5.425	8.836	0.000	0.000	0.000	-6.541	2.411
4	4.470	2.905	0.000	13.409	3.000	0.000	0.000
5	-4.190	0.000	2.724	0.000	0.000	-12.571	3.000

RESULTS FOR COMBINATION 1 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	7.200	-4.716	21.887	-33.958	-5.0	-0.1	89.911
0.75L	5.400	-4.716	21.887	-25.469	-6.4	-0.1	89.995
0.50L	3.600	-4.716	21.887	-16.979	-5.5	-0.1	90.056
0.25L	1.800	-4.716	21.887	-8.490	-3.1	0.0	90.092
Jt. 1	0.000	-4.716	21.887	0.000	0.0	0.0	90.104

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -33.958 kN.m at 7.200m from joint 1

*	*	* JOB : CRANE
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*	* A N A L Y S I S R E S U L T S	*SHEET: 8

RESULTS FOR COMBINATION 1 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	10.510	-20.296	3.851	-26.762	-5.0	-0.1	2.584
0.75L	7.882	-9.806	4.300	12.783	-4.7	-8.3	2.624
0.50L	5.255	0.685	4.750	24.765	-4.5	-12.4	2.444
0.25L	2.627	11.175	5.200	9.185	-4.7	-7.6	2.278
Jt. 2	0.000	21.665	5.649	-33.958	-5.0	-0.1	2.365

Maximum +ve Bending Moment 24.824 kN.m at 5.426m from joint 2
Maximum -ve Bending Moment -33.958 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 1 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.400	4.716	20.113	26.762	-5.0	-0.1	90.130
0.75L	3.300	4.716	20.113	21.574	-2.9	-0.1	90.088
0.50L	2.200	4.716	20.113	16.386	-1.6	-0.1	90.055
0.25L	1.100	4.716	20.113	11.198	-0.8	-0.1	90.031
Jt. 4	0.000	4.716	20.113	6.010	-0.3	-0.1	90.016

Maximum +ve Bending Moment 26.762 kN.m at 4.400m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

RESULTS FOR COMBINATION 1 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.250	1.849	28.249	6.010	-0.3	-0.1	90.016
0.75L	2.438	1.849	28.249	4.507	-0.2	0.0	90.009
0.50L	1.625	1.849	28.249	3.005	-0.1	0.0	90.005
0.25L	0.813	1.849	28.249	1.502	0.0	0.0	90.002
Jt. 5	0.000	1.849	28.249	0.000	0.0	0.0	90.001

Maximum +ve Bending Moment 6.010 kN.m at 3.250m from joint 5
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 1 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	5.006	-11.706	3.456	-8.602	-0.4	-0.1	-2.7[illegible]
0.75L	3.755	-6.712	3.206	2.924	-0.5	-2.9	-2.730
0.50L	2.503	-1.718	2.957	8.199	-0.6	-4.8	-2.837
0.25L	1.252	3.276	2.707	7.225	-0.5	-3.7	-2.982
Jt. 4	0.000	8.269	2.457	0.000	-0.3	-0.1	-3.055

Maximum +ve Bending Moment 8.569 kN.m at 2.072m from joint 4
Maximum -ve Bending Moment -8.602 kN.m at 5.006m from joint 4

RESULTS FOR COMBINATION 1 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	2.867	11.864	8.602	-0.4	-0.1	90.092
0.75L	2.250	2.867	11.864	6.451	0.5	0.0	90.036

0.50L	1.500	2.867	11.864	4.301	0.7	0.0	89.996
0.25L	0.750	2.867	11.864	2.150	0.4	0.0	89.972
Jt. 7	0.000	2.867	11.864	0.000	0.0	0.0	89.964

Maximum +ve Bending Moment 8.602 kN.m at 3.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 7

RESULTS FOR COMBINATION 2 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	7.200	-7.553	14.718	3.939	46.7	-0.1	89.698
0.75L	5.400	-3.503	14.718	13.890	36.9	-0.1	89.671
0.50L	3.600	0.547	14.718	16.550	25.9	0.0	89.626
0.25L	1.800	4.597	14.718	11.920	13.5	0.0	89.584
Jt. 1	0.000	8.647	14.718	0.000	0.0	0.0	89.565

Maximum +ve Bending Moment 16.616 kN.m at 3.843m from joint 1
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 1

RESULTS FOR COMBINATION 2 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	10.510	-27.581	6.378	-65.424	46.7	-0.1	2.358
0.75L	7.882	-17.090	6.827	-6.739	46.9	-4.3	2.648
0.50L	5.255	-6.600	7.277	24.383	47.2	-12.0	2.553
0.25L	2.627	3.890	7.727	27.942	47.2	-11.1	2.309
Jt. 2	0.000	14.381	8.176	3.939	46.7	-0.1	2.152

Maximum +ve Bending Moment 29.838 kN.m at 3.602m from joint 2
Maximum -ve Bending Moment -65.424 kN.m at 10.510m from joint 2

RESULTS FOR COMBINATION 2 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.400	7.553	27.282	65.424	46.7	-0.1	89.904
0.75L	3.300	8.790	27.282	56.435	43.8	-0.1	89.798
0.50L	2.200	10.028	27.282	46.085	39.0	-0.1	89.709
0.25L	1.100	11.265	27.282	34.374	32.7	-0.1	89.639
Jt. 4	0.000	12.503	27.282	21.301	25.3	-0.1	89.590

Maximum +ve Bending Moment 65.424 kN.m at 4.400m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

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		DATE:
	A N A L Y S I S R E S U L T S	SHEET: 10

RESULTS FOR COMBINATION 2 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.250	6.554	32.403	21.301	25.3	-0.1	89.590
0.75L	2.438	6.554	32.403	15.976	19.3	-0.1	89.566
0.50L	1.625	6.554	32.403	10.651	13.0	0.0	89.549
0.25L	0.813	6.554	32.403	5.325	6.6	0.0	89.539
Jt. 5	0.000	6.554	32.403	0.000	0.0	0.0	89.536

Maximum +ve Bending Moment 21.301 kN.m at 3.250m from joint 5
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 2 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	5.006	-14.563	6.684	-22.908	25.3	-0.1	-3.107
0.75L	3.755	-9.570	6.434	-7.806	25.4	1.9	-2.845
0.50L	2.503	-4.576	6.185	1.046	25.3	0.7	-2.795
0.25L	1.252	0.418	5.935	3.648	25.3	-0.3	-2.846
Jt. 4	0.000	5.412	5.685	0.000	25.3	-0.1	-2.887

Maximum +ve Bending Moment 3.670 kN.m at 1.356m from joint 4
Maximum -ve Bending Moment -22.908 kN.m at 5.006m from joint 4

RESULTS FOR COMBINATION 2 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	5.949	14.879	22.908	25.3	-0.1	89.756
0.75L	2.250	6.792	14.879	18.130	21.0	0.0	89.604
0.50L	1.500	7.636	14.879	12.720	15.0	0.0	89.489
0.25L	0.750	8.480	14.879	6.676	7.8	0.0	89.417
Jt. 7	0.000	9.324	14.879	0.000	0.0	0.0	89.392

Maximum +ve Bending Moment 22.908 kN.m at 3.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 7

===

RESULTS FOR COMBINATION 3 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	7.200	-6.183	29.326	-73.680	-57.4	-0.1	90.150
0.75L	5.400	-8.208	29.326	-60.728	-49.6	-0.1	90.342
0.50L	3.600	-10.233	29.326	-44.130	-36.4	-0.1	90.492
0.25L	1.800	-12.258	29.326	-23.888	-19.2	0.0	90.589
Jt. 1	0.000	-14.283	29.326	0.000	0.0	0.0	90.624

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -73.680 kN.m at 7.200m from joint 1

RESULTS FOR COMBINATION 3 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	10.510	-12.927	5.635	10.958	-57.5	-0.1	2.789
0.75L	7.882	-2.437	6.085	31.142	-57.0	-11.5	2.588
0.50L	5.255	8.053	6.534	23.764	-56.9	-11.6	2.333
0.25L	2.627	18.544	6.984	-11.177	-57.3	-3.2	2.260
Jt. 2	0.000	29.034	7.433	-73.680	-57.4	-0.1	2.604

Maximum +ve Bending Moment 31.886 kN.m at 7.272m from joint 2
Maximum -ve Bending Moment -73.680 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 3 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.400	6.183	12.674	-10.958	-57.5	-0.1	90.335
0.75L	3.300	3.708	12.674	-16.398	-50.8	-0.1	90.359
0.50L	2.200	1.233	12.674	-19.116	-43.6	-0.1	90.390
0.25L	1.100	-1.242	12.674	-19.112	-35.8	-0.1	90.424
Jt. 4	0.000	-3.717	12.674	-16.385	-27.4	-0.1	90.455

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 4
Maximum -ve Bending Moment -19.454 kN.m at 1.652m from joint 4

RESULTS FOR COMBINATION 3 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.250	-5.041	23.838	-16.385	-27.4	-0.1	90.455
0.75L	2.438	-5.041	23.838	-12.288	-20.8	0.0	90.473
0.50L	1.625	-5.041	23.838	-8.192	-14.0	0.0	90.486
0.25L	0.813	-5.041	23.838	-4.096	-7.0	0.0	90.494
Jt. 5	0.000	-5.041	23.838	0.000	0.0	0.0	90.497

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment -16.385 kN.m at 3.250m from joint 5

RESULTS FOR COMBINATION 3 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	5.006	-8.759	1.764	6.151	-27.4	0.0	-2.425
0.75L	3.755	-3.765	1.515	13.988	-27.8	-7.8	-2.611
0.50L	2.503	1.229	1.265	15.575	-27.9	-10.4	-2.880
0.25L	1.252	6.222	1.015	10.913	-27.8	-7.2	-3.123
Jt. 4	0.000	11.216	0.766	0.000	-27.4	-0.1	-3.228

Maximum +ve Bending Moment 15.764 kN.m at 2.811m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

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RESULTS FOR COMBINATION 3 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	1.325	8.836	-6.151	-27.4	0.0	90.438
0.75L	2.250	-0.363	8.836	-6.511	-21.4	0.0	90.485
0.50L	1.500	-2.050	8.836	-5.607	-14.7	0.0	90.531
0.25L	0.750	-3.738	8.836	-3.436	-7.5	0.0	90.565
Jt. 7	0.000	-5.425	8.836	0.000	0.0	0.0	90.579

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 7
Maximum -ve Bending Moment -6.541 kN.m at 2.411m from joint 7

RESULTS FOR COMBINATION 4 MEMBER 1

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	7.200	-7.194	-7.497	41.457	48.9	0.0	89.757
0.75L	5.400	2.806	-7.497	15.155	39.2	0.0	89.627
0.50L	3.600	2.806	-7.497	10.103	26.9	0.0	89.591
0.25L	1.800	2.806	-7.497	5.052	13.7	0.0	89.570
Jt. 1	0.000	2.806	-7.497	0.000	0.0	0.0	89.562

Maximum +ve Bending Moment 53.686 kN.m at 5.500m from joint 1
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 1

RESULTS FOR COMBINATION 4 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	10.510	-7.799	6.866	-40.504	48.8	0.0	2.228
0.75L	7.882	-7.799	6.866	-20.014	48.7	3.7	2.487
0.50L	5.255	-7.799	6.866	0.477	48.9	-0.4	2.571
0.25L	2.627	-7.799	6.866	20.967	49.0	-4.3	2.479
Jt. 2	0.000	-7.799	6.866	41.457	48.9	0.0	2.211

Maximum +ve Bending Moment 41.457 kN.m at 0.000m from joint 2
Maximum -ve Bending Moment -40.504 kN.m at 10.510m from joint 2

RESULTS FOR COMBINATION 4 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.400	7.194	7.497	40.504	48.8	0.0	89.774
0.75L	3.300	7.194	7.497	32.591	43.8	0.0	89.710
0.50L	2.200	7.194	7.497	24.678	37.6	0.0	89.660
0.25L	1.100	7.194	7.497	16.765	30.9	0.0	89.624
Jt. 4	0.000	7.194	7.497	8.852	23.4	0.0	89.602

Maximum +ve Bending Moment [illegible].504 kN.m at 4.400m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

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RESULTS FOR COMBINATION 4 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.250	2.724	4.592	8.852	23.4	0.0	89.602
0.75L	2.438	2.724	4.592	6.639	17.7	0.0	89.592
0.50L	1.625	2.724	4.592	4.426	11.9	0.0	89.585
0.25L	0.813	2.724	4.592	2.213	6.0	0.0	89.581
Jt. 5	0.000	2.724	4.592	0.000	0.0	0.0	89.579

Maximum +ve Bending Moment 8.852 kN.m at 3.250m from joint 5
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 5

RESULTS FOR COMBINATION 4 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	5.006	-2.678	4.609	-13.409	23.4	0.0	-3.177
0.75L	3.755	-2.678	4.609	-10.057	23.6	4.5	-2.971
0.50L	2.503	-2.678	4.609	-6.705	23.7	5.1	-2.823
0.25L	1.252	-2.678	4.609	-3.352	23.6	3.2	-2.735
Jt. 4	0.000	-2.678	4.609	0.000	23.4	0.0	-2.705

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 4
Maximum -ve Bending Moment -13.409 kN.m at 5.006m from joint 4

RESULTS FOR COMBINATION 4 MEMBER 6

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	4.470	2.905	13.409	23.4	0.0	89.685
0.75L	2.250	4.470	2.905	10.057	18.7	0.0	89.599
0.50L	1.500	4.470	2.905	6.705	13.0	0.0	89.537
0.25L	0.750	4.470	2.905	3.352	6.7	0.0	89.500
Jt. 7	0.000	4.470	2.905	0.000	0.0	0.0	89.487

Maximum +ve Bending Moment 13.409 kN.m at 3.000m from joint 7
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 7

RESULTS FOR COMBINATION 5 MEMBER 1

Position (m)	Shear Force	Axial Comp.	Bend.Moment	dx	dy	Slope

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 2	7.200	-5.425	7.584	-39.059	-47.4	0.0	90.229
0.75L	5.400	-5.425	7.584	-29.294	-38.6	0.0	90.325
0.50L	3.600	-5.425	7.584	-19.529	-27.2	0.0	90.396
0.25L	1.800	-5.425	7.584	-9.765	-14.0	0.0	90.437
Jt. 1	0.000	-5.425	7.584	0.000	0.0	0.0	90.451

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 1
Maximum -ve Bending Moment -39.059 kN.m at 7.200m from joint 1

RESULTS FOR COMBINATION 5 MEMBER 2

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	10.510	7.345	5.745	38.132	-47.4	0.0	2.667
0.75L	7.882	7.345	5.745	18.834	-47.3	-3.5	2.423
0.50L	5.255	7.345	5.745	-0.463	-47.4	0.4	2.344
0.25L	2.627	7.345	5.745	-19.761	-47.6	4.0	2.431
Jt. 2	0.000	7.345	5.745	-39.059	-47.4	0.0	2.683

Maximum +ve Bending Moment 38.132 kN.m at 10.510m from joint 2
Maximum -ve Bending Moment -39.059 kN.m at 0.000m from joint 2

RESULTS FOR COMBINATION 5 MEMBER 3

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 3	4.400	5.425	-7.584	-38.132	-47.4	0.0	90.213
0.75L	3.300	5.425	-7.584	-44.099	-42.7	0.0	90.285
0.50L	2.200	-4.575	-7.584	-11.317	-36.4	0.0	90.363
0.25L	1.100	-4.575	-7.584	-6.284	-29.3	0.0	90.379
Jt. 4	0.000	-4.575	-7.584	-1.251	-22.0	0.0	90.385

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 4
Maximum -ve Bending Moment -49.795 kN.m at 2.250m from joint 4

RESULTS FOR COMBINATION 5 MEMBER 4

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 4	3.250	-0.385	-4.860	-1.251	-22.0	0.0	90.385
0.75L	2.438	-0.385	-4.860	-0.938	-16.5	0.0	90.387
0.50L	1.625	-0.385	-4.860	-0.626	-11.0	[illegible]	[illegible]
0.25L	0.813	-0.385	-4.860	-0.313	-5.5	0.0	90.388
Jt. 5	0.000	-0.385	-4.860	0.000	0.0	0.0	90.388

Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 5
Maximum -ve Bending Moment -1.251 kN.m at 3.250m from joint 5

RESULTS FOR COMBINATION 5 MEMBER 5

Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	5.006	2.511	-4.321	12.571	-21.9	0.0	-2.567
0.75L	3.755	2.511	-4.321	9.428	-22.2	-4.2	-2.761
0.50L	2.503	2.511	-4.321	6.285	-22.2	-4.8	-2.899
0.25L	1.252	2.511	-4.321	3.143	-22.1	-3.0	-2.982
Jt. 4	0.000	2.511	-4.321	0.000	-22.0	0.0	-3.010

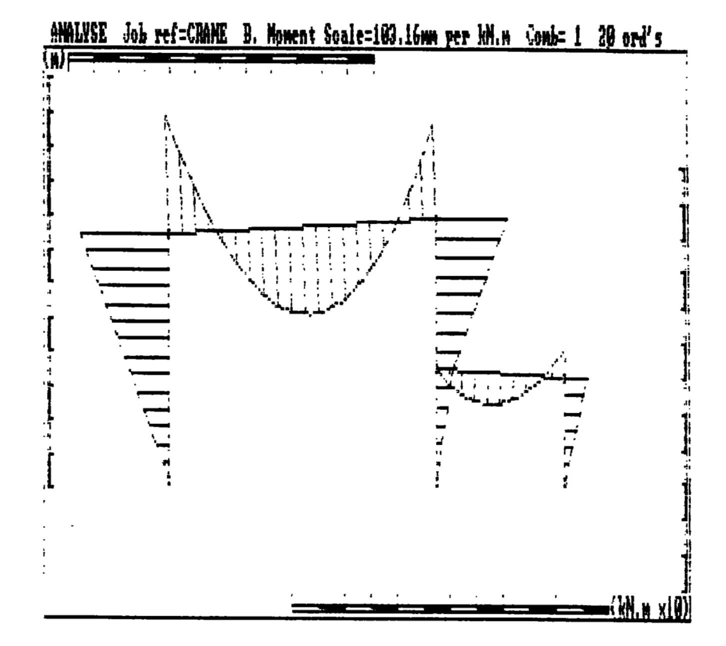
Maximum +ve Bending Moment 12.571 kN.m at 5.006m from joint 4
Maximum -ve Bending Moment 0.000 kN.m at 0.000m from joint 4

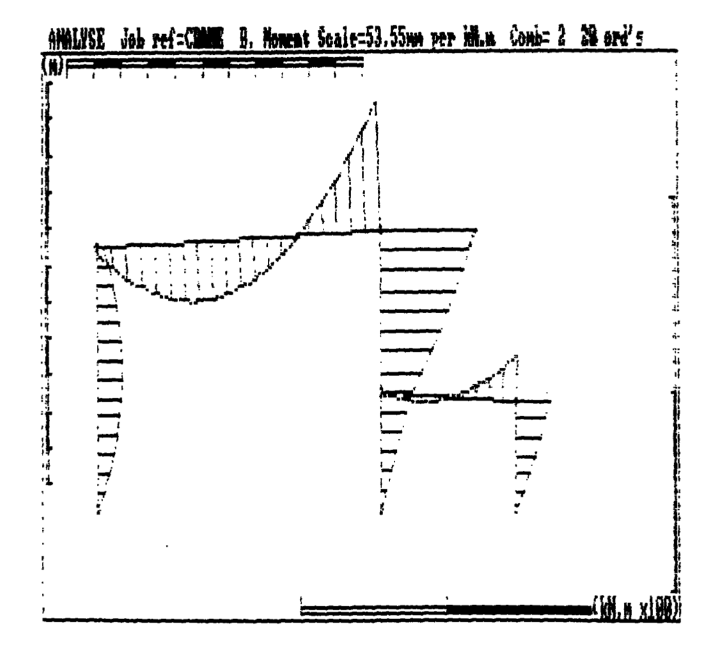
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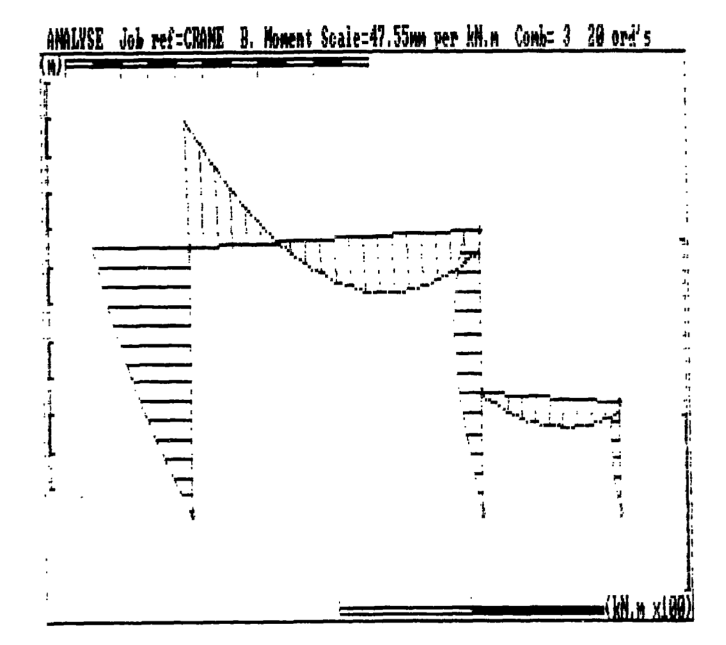
RESULTS FOR COMBINATION 5 MEMBER 6

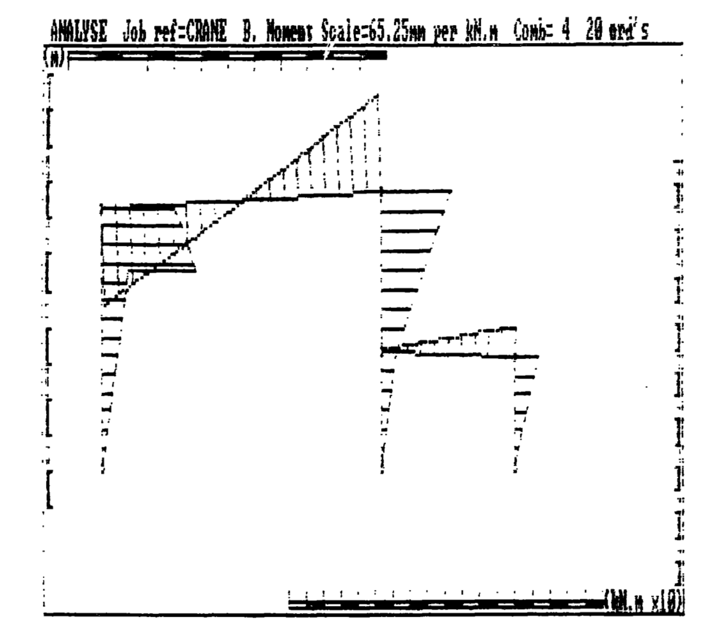
Position (m) from End 1		Shear Force (kN)	Axial Comp. (kN)	Bend.Moment (kN.m)	dx (mm)	dy (mm)	Slope (deg)
Jt. 6	3.000	-4.190	-2.724	-12.571	-21.9	0.0	90.295
0.75L	2.250	-4.190	-2.724	-9.428	-17.5	0.0	90.376
0.50L	1.500	-4.190	-2.724	-6.285	-12.2	0.0	90.434
0.25L	0.750	-4.190	-2.724	-3.143	-6.2	0.0	90.469
Jt. 7	0.000	-4.190	-2.724	0.000	0.0	0.0	90.481

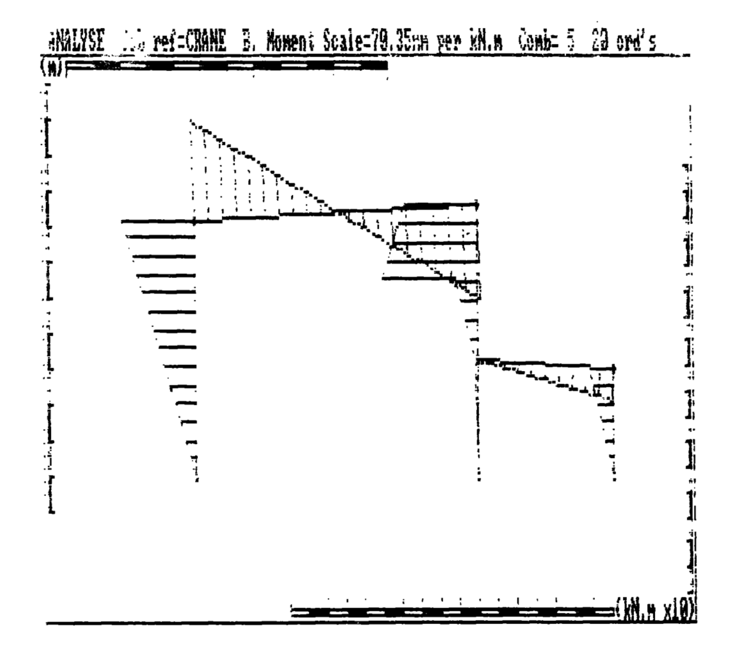
Maximum +ve Bending Moment 0.000 kN.m at 0.000m from joint 7
Maximum -ve Bending Moment -12.571 kN.m at 3.000m from joint 7


ANALYSE Job ref=CRANE B. Moment Scale=103.16mm per kN.m Comb= 1 20 ord's
(m)
(kN.m x10)


ANALYSE Job ref=CRANE B. Moment Scale=53.55mm per kN.m Comb= 2 20 ord's
(M)
(kN.m x100)


ANALYSE Job ref=CRANE B. Moment Scale=47.55mm per kN.m Comb= 3 20 ord's
(m)
(kN.m x100)


ANALYSE Job ref=CRANE B. Moment Scale=65.25mm per kN.m Comb= 4 20 ord's
(m)
(kN.m x10)


ANALYSE ref=CRANE B. Moment Scale=79.35mm per kN.m Comb= 5 20 ord's
(m)
(kN.m x10)

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